Reportable Diseases and Conditions in Missouri

BIENNIAL REPORT 1996–97

MISSOURI DEPARTMENT OF HEALTH

Reportable Diseases and Conditions in Missouri

Biennial Report 1996–97

Information Provided by
Division of Environmental Health and
Communicable Disease Prevention

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Division of Environmental Health and Communicable Disease Prevention

VISION

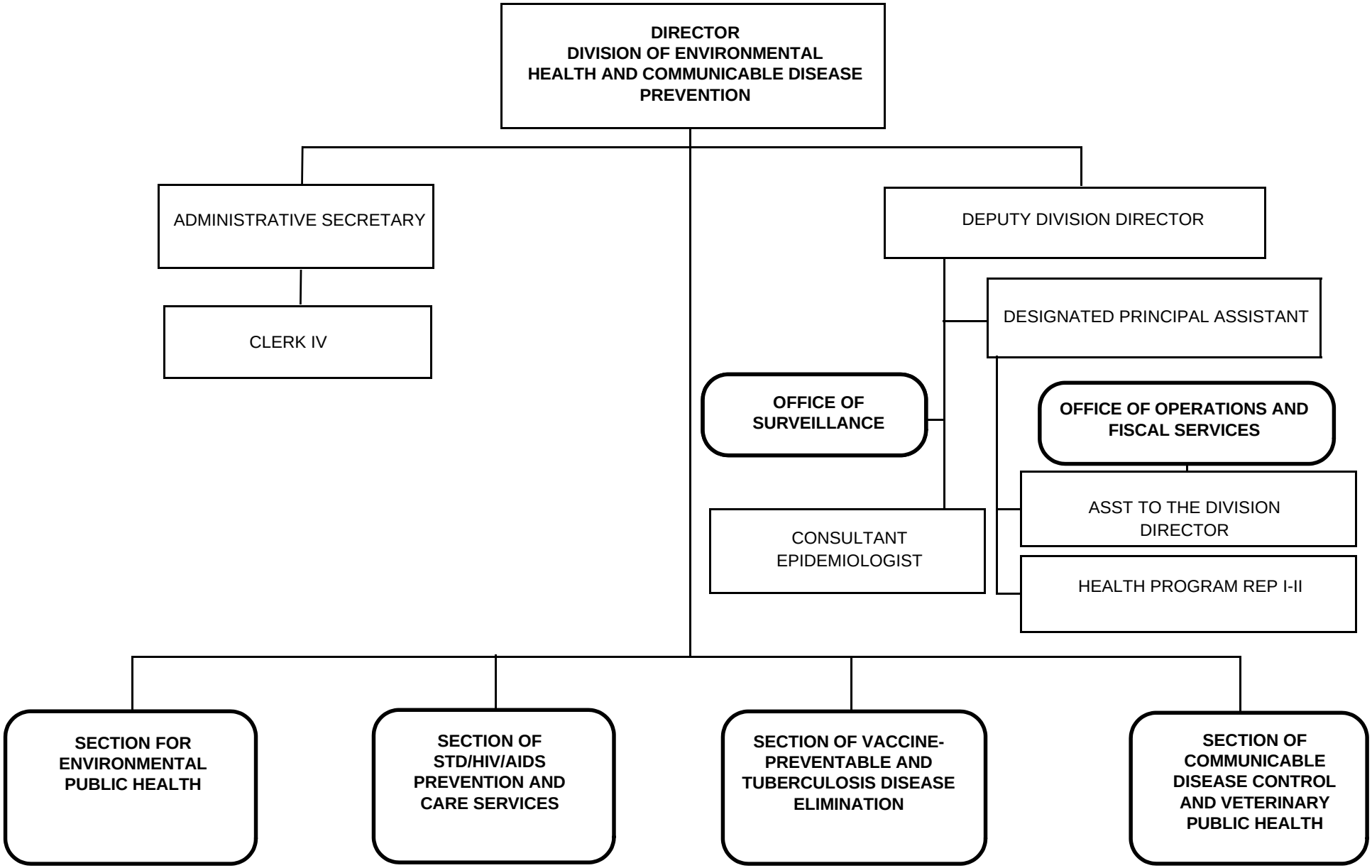
Missouri citizens and communities will enjoy optimal health through reduction of communicable diseases and environmental hazards. As experts in the field, we will continually enhance our level of knowledge and experience in order to assure that our methods, tools and interventions reflect community involvement and remain effective within diverse cultures.

MISSION

The Division of Environmental Health and Communicable Disease Prevention's mission is to protect and promote the public's health by:

- assessing indicators of communicable disease and environmental hazards;
- assuring access to disease prevention, intervention, and environmental assessment services;
- developing policies and regulations;
- educating the public and promoting healthy behaviors; and
- collaborating with public and private entities.

DIVISION OF ENVIRONMENTAL HEALTH AND COMMUNICABLE DISEASE PREVENTION



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Introduction

This is the fourth biennial report of the disease incidence data received by the Missouri Department of Health, Division of Environmental Health and Communicable Disease Prevention in the 1990s. It contains information about the reportable communicable diseases (including tuberculosis, AIDS and other sexually transmitted diseases), as well as data on environmental and occupational diseases and conditions (such as carbon monoxide poisoning, hazardous substance releases and workplace fatalities). Information contained in this report should be useful to health care professionals, public health professionals and policy-makers.

Each of the major diseases and conditions is presented with a brief introduction and summaries of the key statistics and trends, supplemented by tables and graphs. To help put disease trends into perspective, graphs are presented showing disease incidence for the 15-year period 1983–1997 if those data are available.

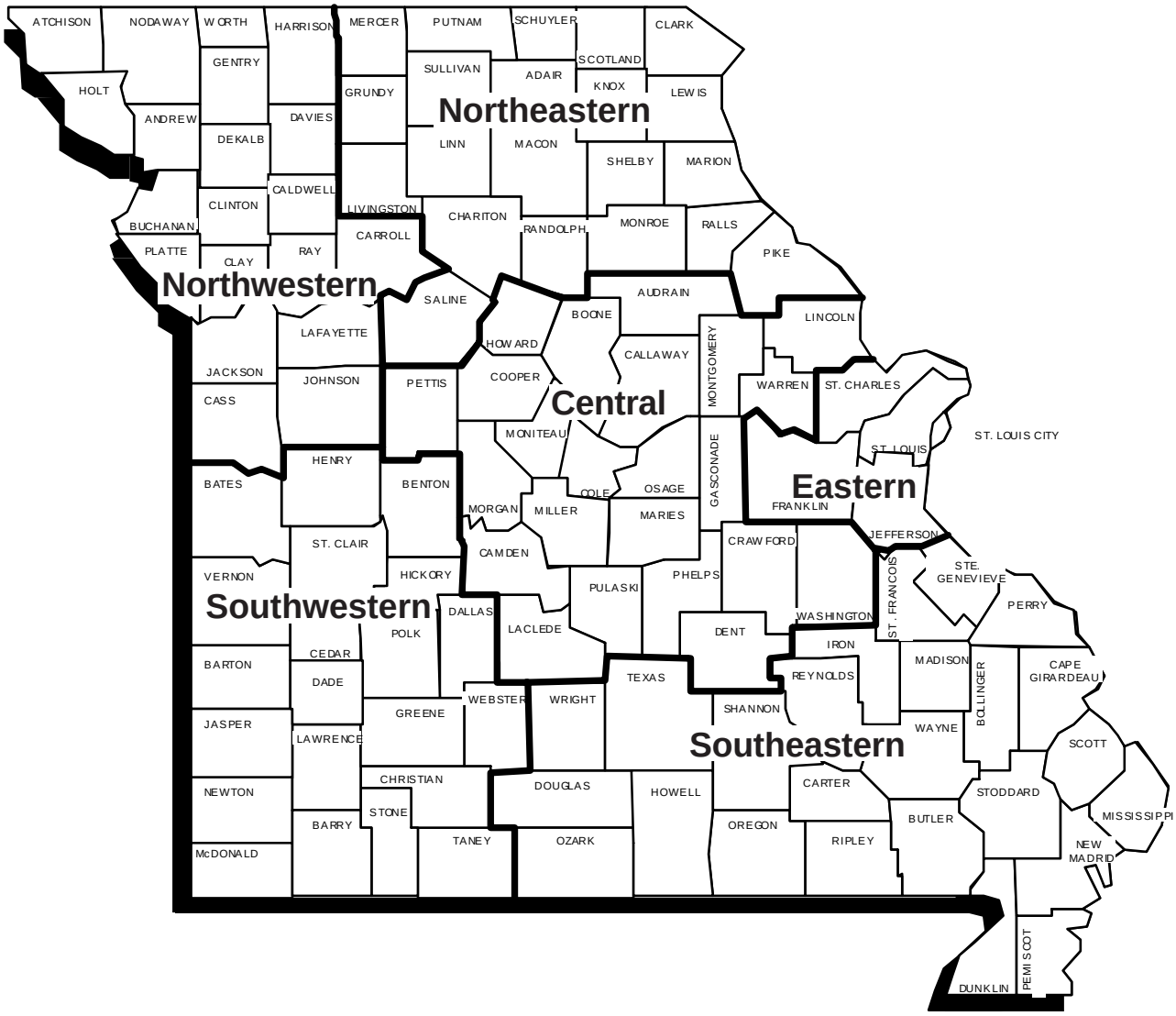
Reports of diseases of low incidence are provided in table form on page 71. The table on page 73 shows the data for diseases reported in large numbers through an active sentinel system that does not identify individuals. In this table, the much smaller numbers of cases reported through the passive surveillance system are included for comparison. Some cases may be reported through both the passive and active systems.

Physicians, physician assistants, nurses, hospitals, clinics and laboratories are required by law to report cases of diseases specified by the Department of Health. Most reports are routed through local and district health departments. Some reports are sent directly to the state agency. Reports are evaluated when received to determine if they meet case definitions and to determine if follow-up or intervention is required.

The reported information is often supplemented by additional data collected by contacting the reporting source. Case reports of certain diseases and conditions are followed by local or Department of Health investigators to assure that patients receive appropriate treatment and that contacts are afforded the benefits of preventive measures and education. Examples of these are tuberculosis, syphilis, HIV/AIDS, hepatitis, meningitis, pertussis measles, childhood lead poisoning and workplace fatalities.

Reports of single cases or small numbers of unusual diseases may lead to discovery and investigation of outbreaks, which in turn may stimulate specific recommendations for control measures to interrupt transmission. Reports may identify groups at high risk, leading to targeted intervention efforts with those groups. Data also help in health planning, policy making and research.

Department of Health Districts



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Jefferson City, MO 65109
(573) 751-4216

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220 S. Jefferson
St. Louis, MO 63130
(314) 877-2800

Northeastern District Health Office
708 Patton Street, P.O. Box 309
Macon, MO 63552
(660) 385-3125

Northwestern District Health Office
13901 Noland Court
Independence, MO 64055
(816) 325-6100

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(573) 840-9720

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P.O. Box 777, MPO
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Springfield, MO 65801
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Department of Health Reporting Rules

19 CSR 20-20.020 Reporting Communicable, Environmental and Occupational Diseases

PURPOSE: *This rule designates the diseases, disabilities, conditions and findings that must be reported to the local health authority or the Department of Health. It also establishes when they must be reported.*

Editor's Note: The following material is incorporated into this rule by reference:

1) 56 ***Federal Register*** *52166–52175, October 17, 1991 (Washington: U.S. Government Printing Office, 1991).*

In accordance with section 536.031(4), RSMo, the full text of material incorporated by reference will be made available to any interested person at the Office of the Secretary of State and the headquarters of the adopting state agency.

(1) Category I diseases or findings shall be reported to the local health authority or to the Department of Health within twenty-four (24) hours of first knowledge or suspicion by telephone, facsimile or other rapid communication. Category I diseases or findings are–

- Acute chemical poisoning as defined in 56 FR 52166–52175
- Anthrax
- Botulism
- Brucellosis
- Cholera
- Diphtheria
- Group A Streptococcal disease, invasive
- Haemophilus influenzae disease, invasive, including meningitis
- Hantavirus
- Hemolytic Uremic Syndrome, post-diarrheal
- Hepatitis A
- Hyperthermia
- Hypothermia
- Measles
- Meningococcal disease, invasive, including meningitis
- Methemoglobinemia
- Outbreaks or epidemics of any illness, disease or condition that may be of public health concern
- Pesticide poisoning
- Plague
- Poliomyelitis
- Psittacosis
- Rabies
- Rubella
- Syphilis
- Tuberculosis disease
- Typhoid fever

(2) Category II diseases or findings shall be reported to the local health authority or the Department of Health within three (3) days of first knowledge or suspicion. Category II diseases or findings are–

- Acquired immunodeficiency syndrome (AIDS)
- Arsenic poisoning
- Cadmium poisoning
- Campylobacter infections
- Carbon monoxide poisoning
- Chancroid
- Chlamydia trachomatis infections
- Cryptosporidiosis
- *E. coli* O157:H7
- Ehrlichiosis
- Encephalitis, arthropod-borne
- Giardiasis
- Gonorrhea
- Hepatitis B, acute
- Hepatitis B Surface Antigen (prenatal HBsAg) positive screening of pregnant women
- Hepatitis non-A, non-B
- Human immunodeficiency virus (HIV) infection, confirmed
- Influenza
- Kawasaki disease
- Lead exposure greater than or equal to ten micrograms per deciliter (≥10 µg/dl) in persons under age eighteen (<18) or greater than or equal to twenty-five micrograms per deciliter (≥25 µg/dl) in persons age eighteen or greater (≥18)
- Legionellosis
- Leptospirosis
- Listeria monocytogenes
- Lyme disease
- Malaria
- Meningitis, aseptic
- Mercury poisoning
- Mumps
- Mycobacterial disease other than tuberculosis (MOTT)
- Nosocomial outbreaks
- Occupational lung diseases including silicosis, asbestosis, byssinosis, farmer's lung and toxic organic dust syndrome
- Pertussis
- Respiratory diseases triggered by environmental factors including environmentally or occupationally induced asthma and bronchitis
- Reye syndrome
- Rocky Mountain spotted fever
- Salmonella infections
- Shigella infections

Tetanus
T-Helper (CD4+) lymphocyte count on any person with HIV infection
Toxic shock syndrome
Trichinosis
Tuberculosis infection
Tularemia
Yersinia enterocolitica

(3) The occurrence of any outbreak or epidemic of any illness or disease which may be of public health concern, including any illness in a food handler that is potentially transmissible through food, shall be reported to the local health authority or the Department of Health by telephone, facsimile, or other rapid communication within twenty-four (24) hours of first knowledge or suspicion.

(4) A physician, physician's assistant, nurse, hospital, clinic, or other private or public institution providing care to any person who is suffering from any disease, condition or finding listed in sections (1)–(3) of this rule, or who is suspected of having any of those diseases, conditions or findings shall make a case report to the local health authority or the Department of Health or cause a case report to be made by their designee within the specified time.

(A) A physician, physician's assistant, or nurse providing care to any patient, with any disease, condition or finding listed in sections (1)–(3) of this rule, in an institution may authorize, in writing, the administrator or designee of the institution to submit case reports on patients attended by the physician, physician's assistant, or nurse at the institution. But under no other circumstances shall the physician, physician's assistant, or nurse be relieved of this reporting responsibility.

(B) Duplicate reporting of the same case by health care providers in the same institution is not required.

(5) A case report as required in section (4) of this rule shall include the patient's name, address, age, sex, race, phone number, name of the disease, condition or finding diagnosed or suspected, the date of onset of the illness, name and address of the treating facility (if any) and the attending physician, any appropriate laboratory results, name and address of the reporter, and the date of report.

(A) A report of an outbreak or epidemic as required in section (3) of this rule shall include the diagnosis or principal symptoms, the approximate number of cases, the local health authority jurisdiction within which the cases occurred, the identity of any cases known to the reporter, and the name and address of the reporter.

(6) Any person in charge of a public or private school, summer camp or day care facility shall report to the local health authority or the Department of Health the presence or suspected presence of any diseases or findings listed in sections (1)–(3) of this rule according to the specified time frames.

(7) All local health authorities shall forward to the Department of Health reports of all diseases or findings listed in sections (1)–(3) of this rule. All reports shall be forwarded within twenty-four (24) hours after being received, according to procedures established by the Department of Health director. The local health authority shall retain from the original report any information necessary to carry out the required duties in 19 CSR 20-20.040(2) and (3).

(8) Information from patient medical records received by the Department of Health is to be considered confidential records and not public records.

(9) Reporters specified in section (4) of this rule will not be held liable for reports made in good faith in compliance with this rule.

(10) This rule will expire on June 30, 2000.

Auth: sections 192.006, RSMo (Cum. Supp. 1995) and 192.020, 201.040 and 210.050, RSMo (1994). This rule was previously filed as 13 CSR 50-101.020. Original rule filed July 15, 1948, effective Sept. 13, 1948. For intervening history, please consult the* ***Code of State Regulations****. Amended: Filed Sept. 15, 1995, effective April 30, 1996.*

**Original authority: 192.006, RSMo (1993), amended 1995; 192.020, RSMo (1939), amended 1945, 1951; 210.040, RSMo (1941), amended 1993; and 210.050, RSMo (1941), amended 1993.*

19 CSR 20-20.080 Duties of Laboratories

PURPOSE: *This rule establishes the responsibility of laboratories to report to the Missouri Department of Health the results of all positive tests for specified diseases.*

(1) The director or person in charge of any laboratory shall report to the local health authority or the Missouri Department of Health the result of any test that is positive for, or suggestive of, any disease listed in 19 CSR 20-20.020. These reports shall be made according to the time and manner specified for each disease or condition following completion of the test and shall designate the test performed, the results of test, the name and address of the attending physician, the name of the disease or condition diagnosed or suspected, the date the test results were obtained, the name of the patient and the patient's age, sex and race.

(2) In reporting findings for diseases listed in 19 CSR 20-20.020, laboratories shall report–

- Blood or serum chemical/pesticide level greater than the Lowest Quantifiable Limit;
- Blood lead level greater than or equal to ten micrograms per deciliter (≥10 µg/dl) in persons under age eighteen (<18) or greater than or equal to twenty-five micrograms per deciliter (≥25 µg/dl) in persons age eighteen or greater (≥18);
- Blood mercury level greater than or equal to three-tenths micrograms per deciliter (≥0.3 µg/dl);
- Carboxyhemoglobin level greater than fifteen percent (15%);
- Urinary arsenic level greater than or equal to one hundred micrograms per liter (≥100 µg/l);
- Urinary cadmium level greater than or equal to one microgram per liter (≥1.0 µg/l); and
- Urinary mercury level greater than or equal to twenty micrograms per liter (≥20 µg/l).

(3) This rule will expire on June 30, 2000.

Auth: sections 192.006, RSMo (Cum. Supp. 1995) and 192.020, RSMo (1994). This rule was previously filed as 13 CSR 50-101.090. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed Aug. 14, 1992, effective April 8, 1993. Amended: Filed Sept. 15, 1995, effective April 30, 1996.*

**Original authority: 192.006, RSMo (1993), amended 1995 and 192.020, RSMo (1939) amended 1945, 1951.*

Missouri Morbidity and Mortality Reports of Selected Communicable Diseases - 15 Year Report

	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
AIDS	501	845	769	727	1644	657	651	596	478	401	240	91	52	28	6
Brucellosis	2	2	0	0	0	0	3	1	2	4	14	4	12	7	4
Campylobacter	574	554	601	631	616	614	602	547	473	441	260	281	304	260	166
Chickenpox	6319	5830	8840	10147	9609	10009	7678	10591	9086	11350	8595	5093	2474	2565	408
Chlamydia	12257	11952	12084	12244	11625	11907	10643	11151	8151	6239	2944	1532	412	9	-
Encephalitis, Inf.	9	5	11	14	26	16	22	12	6	8	11	13	12	11	28
Giardiasis	800	777	761	774	770	739	790	878	859	654	690	516	458	462	216
Gonorrhea	7658	8415	11302	12555	13147	14887	17450	20012	21053	17241	16491	19029	20023	20042	20750
Haemophilus influenzae type B															
Meningitis	1	0	10	7	12	22	42	88	106	138	131	172	108	104	86
Other Invasive	7	8	18	44	123	59	39	57	-	-	-	-	-	-	-
Hepatitis A	1151	1414	1338	619	1443	1500	653	619	810	897	560	126	98	138	123
Hepatitis B	360	326	437	538	585	535	549	633	704	639	460	420	359	297	365
Non A, Non B	4	23	23	32	25	27	31	42	53	50	46	39	42	18	33
Unspecified	1	0	1	1	19	9	15	19	13	21	21	15	24	46	87
Influenza (confirmed)	270	283	491	163	272	111	462	220	293	148	69	78	61	39	140
Lyme Disease	28	52	53	102	108	150	207	205	108	-	-	-	-	-	-
Malaria	16	11	9	14	9	12	9	13	13	6	8	12	5	8	4
Meningitis, Aseptic	99	120	269	175	275	272	277	246	223	124	163	172	156	95	277
Meningitis, Meningococcal	43	57	54	43	34	32	37	31	21	33	35	40	46	53	55
Mumps	0	10	25	44	46	39	40	62	87	68	38	23	18	11	21
Pertussis	80	74	63	45	144	120	83	116	141	25	46	32	35	23	24
Polio, all forms	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2
Rabies, Animal	31	26	30	27	35	37	28	30	62	36	59	75	59	70	96
RMSF	24	19	30	22	20	24	25	36	48	54	26	25	10	14	14
Rubella	2	0	0	2	1	1	5	3	4	0	0	1	7	0	0
Rubeola	1	3	2	161	1	0	1	103	671	65	190	32	5	6	1
Salmonellosis	568	565	577	642	529	426	616	723	676	772	660	728	690	617	602
Shigellosis	222	387	1138	654	674	742	259	284	411	607	471	89	143	244	264
Syphilis, Total	505	603	1271	1985	2499	1940	926	598	388	473	328	494	578	712	801
Primary & Secondary	118	221	584	987	1354	1167	572	272	162	154	90	110	133	186	145
Tetanus	0	1	3	1	1	1	1	0	4	1	1	2	3	6	1
Tuberculosis	248	224	244	260	256	245	254	312	278	275	339	338	311	354	399
Tularemia	18	9	25	24	17	34	44	33	39	45	58	32	35	40	51
Typhoid Fever	1	2	3	1	2	3	2	4	2	3	7	6	6	6	10
Yersinia enterocolitica	30	16	21	40	26	37	48	32	36	30	10	6	2	3	1

Diseases of the Gastrointestinal Tract

Campylobacteriosis *(Campylobacter enteritis)*

Campylobacteriosis is an acute enteric disease of bacterial origin. The disease is characterized by bloody and mucoid diarrhea, abdominal cramps, fever, nausea, and vomiting. The primary mode of transmission for this disease is through consumption of inadequately cooked foods of animal origin, including poultry, beef, pork, and unpasteurized milk. This disease can also be acquired by individuals such as veterinarians, farmers, and food processing workers, who are exposed to animals and animal products.

In Missouri, there were 554 cases of campylobacteriosis reported in 1996 and 574 cases in 1997. The number of cases began increasing in 1987 to a high of 631 in 1994 and then declined until 1997. (See Figure 1.)

The highest incidence occurred in those less than 5 years of age, with incidence rates of 21.1 per 100,000 in 1996 and 29.6 per 100,000 in 1997. (See Figure 2.)

The Southwestern health district had the highest incidence with a rate of 15.7 per 100,000 in 1996. The rate increased to 17.8 per 100,000 in 1997 for the Southwestern health district. (See Figure 3.)

Among the cases reported in 1996, 120 (21.7%) were hospitalized. One death was reported for a case fatality rate of 1.8 per 1,000. In 1997, 92 (16.0%) were hospitalized and two deaths were reported for a case fatality rate of 3.5 per 1,000.

Despite the high number of cases reported in children under 5 and a substantial number in children in the 5–9 age group, less than 1.8 percent

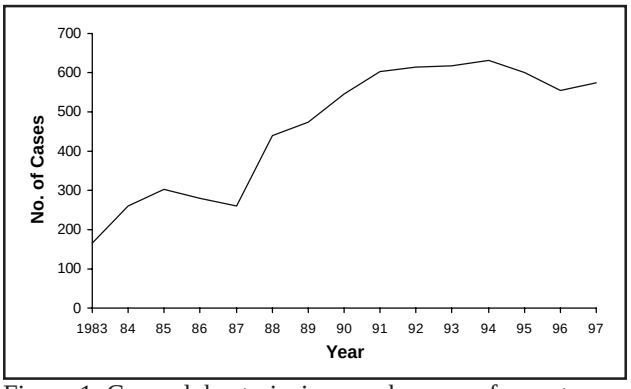


Figure 1. Campylobacteriosis cases by year of report, Missouri, 1983–97

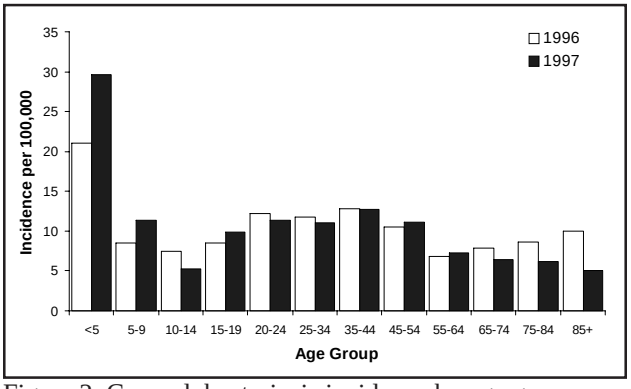


Figure 2. Campylobacteriosis incidence by age group, Missouri, 1996 and 1997

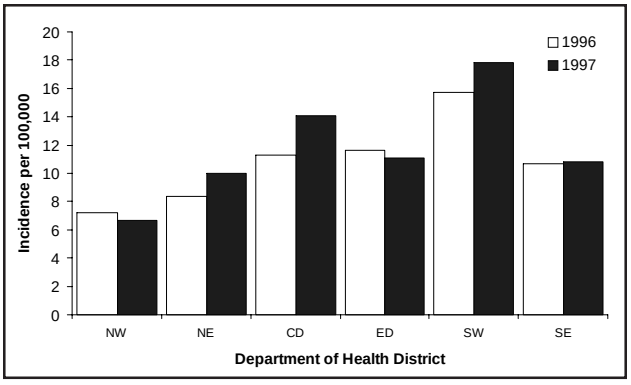


Figure 3. Campylobacteriosis incidence by health district, Missouri, 1996 and 1997

of reported cases occurred in child care settings. Like many other enteric diseases, the primary mode of transmission for campylobacter is food, but the causes of many diarrheal illnesses are underreported. The physician is the first point of contact in tracking and controlling possible foodborne illness, but physicians only notified the health department of 8.12 percent of the reported cases of campylobacterosis in 1996 and 7.49 percent in 1997. The majority of cases are reported by laboratories.

Figure 4 shows the incidence rates by county in 1997.

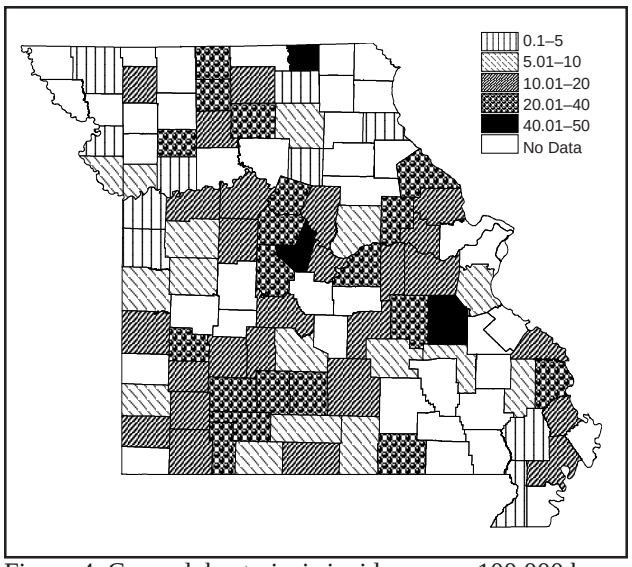


Figure 4. Campylobacteriosis incidence per 100,000 by county, Missouri, 1997

Escherichia coli O157:H7

Since its identification as a cause of human illness in 1982, *Escherichia coli* O157:H7 has emerged as an important cause of diarrheal illness in the United States. It is also the most common cause of hemolytic uremic syndrome (HUS), an illness characterized by acute renal failure, anemia and low platelet count. The typical symptoms of *E. coli* O157:H7 infection are abdominal cramps and bloody diarrhea, with little or no fever. Some patients have nonbloody diarrhea; in others, the bleeding is profuse.

Transmission occurs by ingestion of contaminated food, most often inadequately cooked beef; directly from person to person in families, child care centers, and custodial institutions; and through contaminated drinking or recreational water. Serious outbreaks have occurred in the United States from inadequately cooked hamburgers. Other vehicles identified in outbreaks include unpasteurized milk, apple cider made from apples contaminated with cow manure, contaminated unchlorinated municipal water, and various foods cross-contaminated by raw beef.

E. coli has been a reportable disease in Missouri since mid-1992. In 1996, 74 cases were reported and in 1997, the number of cases dropped to 58.

The highest incidence occurred in those less than 5 years of age, with incidence rates of 5.3 per 100,000 in 1996, and 3.2 per 100,000 in 1997. (See Figure 1.)

The Southwestern health district had the highest incidence in 1996, with a rate of 2.3 per 100,000. The Central health district had the highest incidence in 1997, with a rate of 2.3 per 100,000. (See Figure 2.) Figure 3 shows the incidence rates by county in 1997.

Among the cases reported in 1996, 28 (37.8%) were hospitalized. One death was reported for a case fatality rate of 13.5 per 1,000. In 1997, 23 (39.7%) were hospitalized and no deaths were reported.

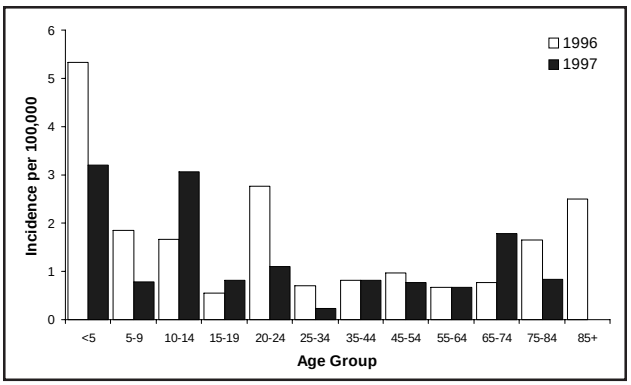


Figure 1. *E. coli* O157:H7 incidence by age group, Missouri, 1996 and 1997

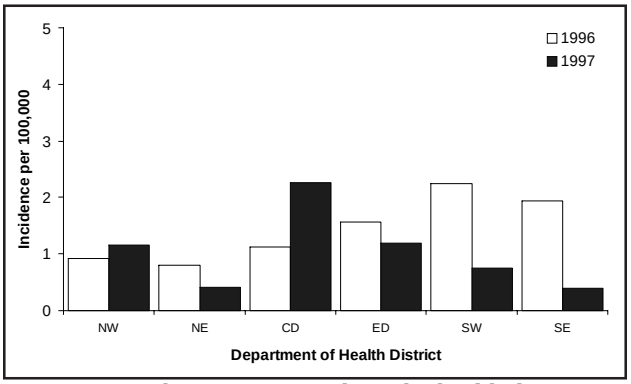


Figure 2. *E. coli* O157:H7 incidence by health district, Missouri, 1996 and 1997

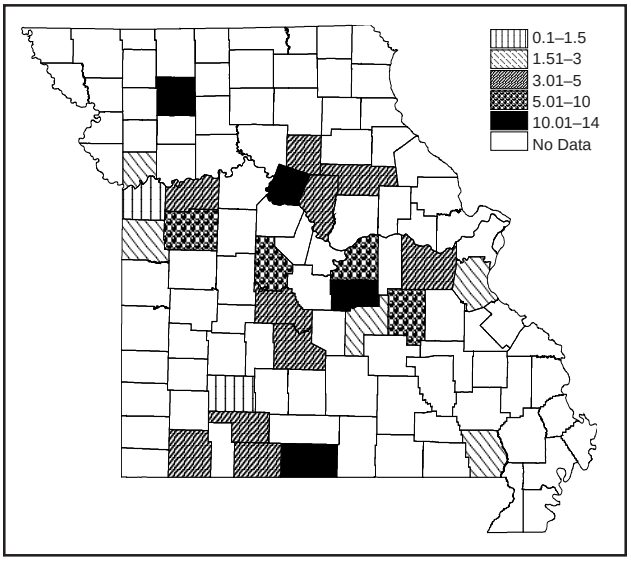


Figure 3. *E. coli* O157:H7 incidence per 100,000 by county, Missouri, 1997

Giardiasis (*Giardia enteritis*)

Giardiasis is usually a mild intestinal disease caused by a protozoan flagellate, *Giardia lamblia.* This protozoan infects the upper small intestine and usually does not produce symptoms. It is sometimes associated with symptoms such as chronic diarrhea, abdominal cramps, bloating, steatorrhea, fatigue and weight loss. The parasite can be passed from person to person by the fecal-oral route or through contaminated food and water.

In Missouri, there were 777 cases of giardiasis reported in 1996 and 800 cases in 1997. The number of cases reported annually increased relatively steadily from the time giardiasis became reportable in 1979 until 1990, and declined in years 1991 and 1992, rising slightly in 1993. Since 1993, the numbers of cases have fluctuated between 760 and 800. (See Figure 1.)

This disease continues to affect primarily those less than 5 years of age with incidence rates of 56.8 per 100,000 in both 1996 and 1997. (See Figure 2.)

The Southwestern health district had the highest incidence in 1996, with a rate of 20.2 per 100,000. The Central health district had the highest incidence in 1997, with a rate of 20.0 per 100,000. (See Figure 3.) Figure 4 shows the incidence rates by county in 1997.

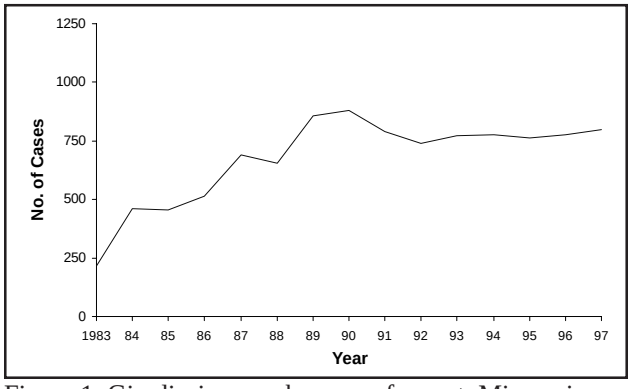


Figure 1. Giardiasis cases by year of report, Missouri, 1983–97

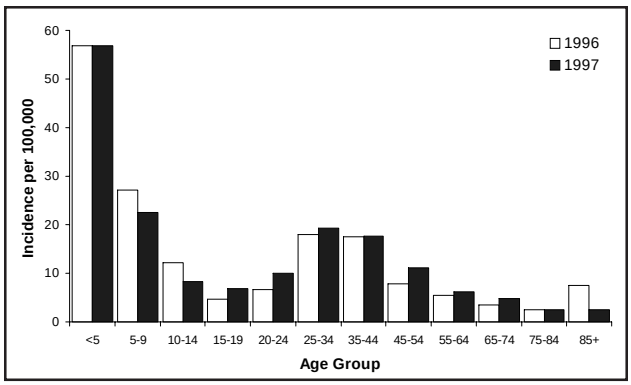


Figure 2. Giardiasis incidence by age group, Missouri, 1996 and 1997

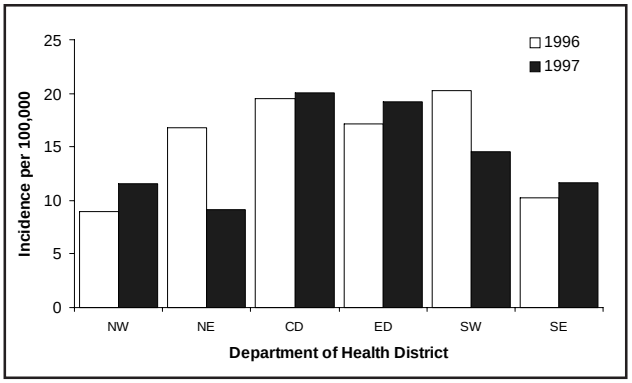


Figure 3. Giardiasis incidence by health district, Missouri, 1996 and 1997

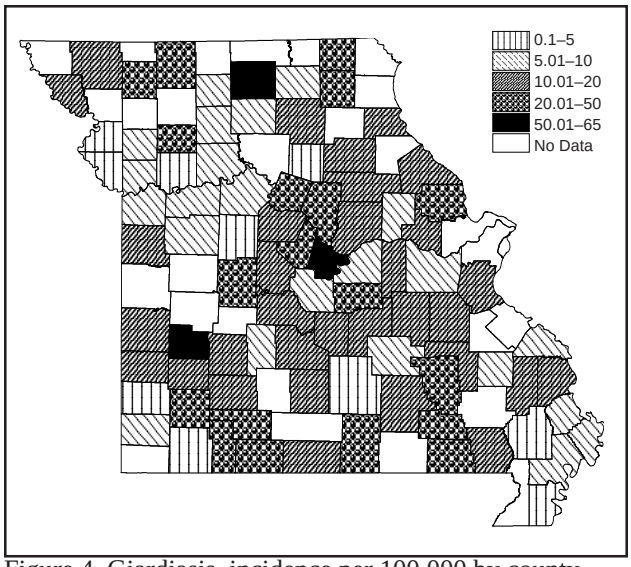


Figure 4. Giardiasis incidence per 100,000 by county, Missouri, 1997

Salmonellosis

Salmonellosis is a bacterial infection that can be caused by a variety of *Salmonella* organisms. The genus *Salmonellae* includes over 2,000 serotypes. Each serotype has its own antigenic composition and usual host range. Salmonellosis manifests with the following symptoms: acute enterocolitis, abdominal pain, diarrhea, vomiting, nausea, and anorexia. Symptoms may be mild and infections may occur without symptoms. Deaths associated with salmonellosis are rare, but the morbidity and the associated costs of this disease are high. There is regional variation in the prevalence of the different serotypes; *S. enteritidis* and *S. typhimurium* are the two most commonly reported serotypes in the United States and Missouri.

Transmission of *Salmonella* organisms occurs through infected food animals or fecal contamination of food. Common sources include poultry, meat and meat products, raw and undercooked eggs and egg products, raw milk and raw milk products, as well as pet turtles and chicks and unsterilized pharmaceuticals of animal origin.

In Missouri, there were 565 cases of salmonellosis reported in 1996 and 568 cases in 1997. (See Figure 1.)

Children less than 5 years of age had the highest rate of *Salmonella* infection, with incidence rates of 38.9 per 100,000 in 1996 and 36.3 per 100,000 in 1997. (See Figure 2.)

The Southwestern health district had the highest incidence in 1996 with a rate of 13.8 per 100,000. The Northwestern health district had the highest incidence in 1997 with a rate of 18.0 per 100,000. (See Figure 3.)

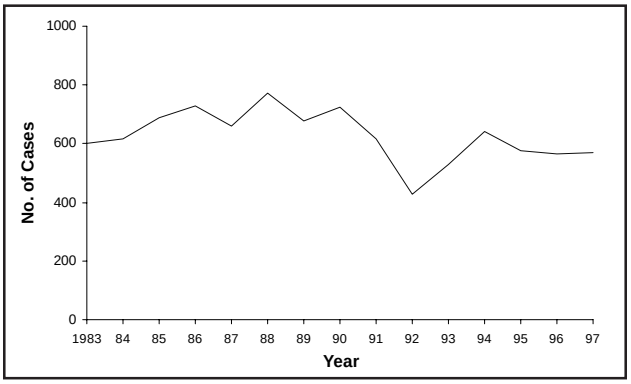


Figure 1. Salmonellosis cases by year of report, Missouri, 1983–97

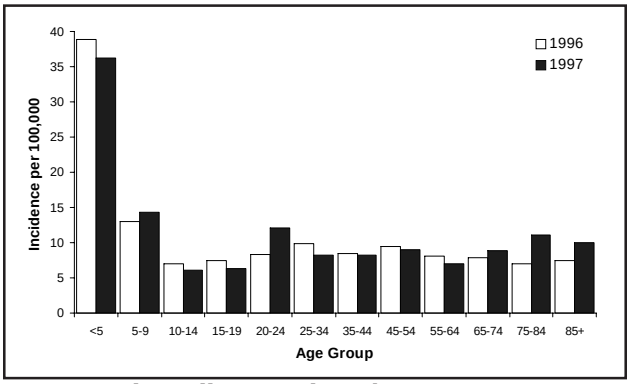


Figure 2. Salmonellosis incidence by age group, Missouri, 1996 and 1997

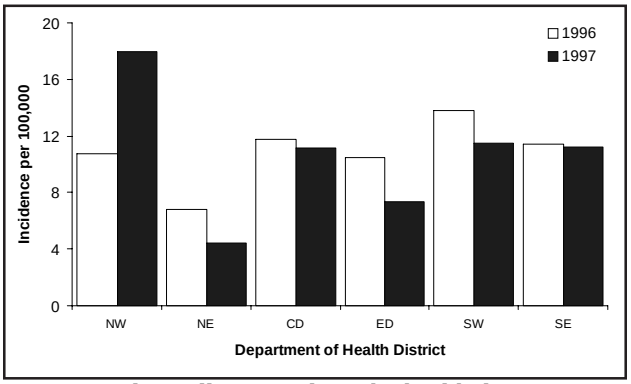


Figure 3. Salmonellosis incidence by health district, Missouri, 1996 and 1997

Figure 4 shows the incidence rates by county in 1997.

The most common serotypes reported in Missouri in 1996 and 1997 are shown in Table 1. Three of the serotypes listed in Table 1 were incriminated in two outbreaks in 1997. Both outbreaks resulted from foodborne transmission of rare serotypes and affected a total of 121 people in Missouri. An outbreak caused by *S. agona* involved 105 people who had eaten in the same restaurant over a period of time. The second outbreak affected 16 people in Missouri plus a total of 93 people in Kansas, Oklahoma and Minnesota. This outbreak was caused by growing alfalfa sprouts from seeds contaminated with *S. infantis* and *S. anatum* with subsequent distribution of the sprouts to grocery stores, restaurants, and wholesalers.

Among the reported cases in 1996, 157 (27.8%) were hospitalized. One death was reported for a case fatality rate of 1.8 per 1,000. In 1997, 132 (23.2%) cases were hospitalized and one death was reported for a case fatality rate of 1.8 per 1,000.

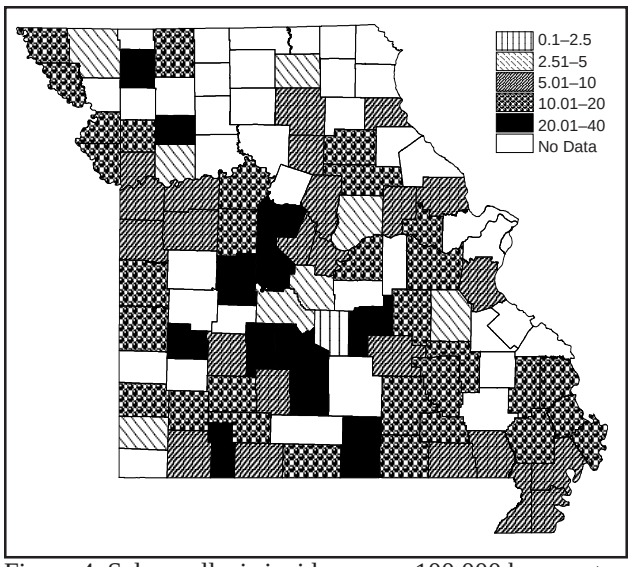


Figure 4. Salmonellosis incidence per 100,000 by county, Missouri, 1997

The physician is the first point of contact in tracking and controlling possible foodborne illness, but physicians only notified the health department of 6.35 percent of the reported cases of salmonellosis. The majority of cases are reported by laboratories.

Table 1. Most common reported *Salmonella* serotypes, Missouri, 1996 and 1997

	1996			1997		
	Serotype	No. of Cases	Percent	Serotype	No. of Cases	Percent
1.	*S. typhimurium*	134	23.7%	*S. typhimurium*	105	18.5%
2.	*S. enteritidis*	64	11.3%	*S. agona*	84	14.8%
3.	*S. braenderup*	46	8.1%	*S. enteritidis*	35	6.2%
4.	*S. newport*	36	6.4%	*S. montevideo*	27	4.8%
5.	*S. heidelberg*	23	4.1%	*S. heidelberg*	23	4.0%
6.	*S. javiana*	12	2.1%	*S. infantis*	20	3.5%
7.	*S. infantis*	11	1.9%	*S. newport*	17	3.0%
8.	*S. oranienburg*	10	1.8%	*S. hadar*	11	1.8%
9.	*S. poona*	10	1.8%	*S. thompson*	9	1.6%
10.	*S. agona*	8	1.4%	*S. anatum*	8	1.4%
11.	*S. thompson*	8	1.4%	*S. poona*	8	1.4%
				S. 4,5:1:-monophasic	8	1.4%
	Other/Unknown	203	36.0%	Other/Unknown	213	37.5%
	Total	**565**	**100.0%**	**Total**	**568**	**100.0%**

Shigellosis (Bacillary dysentery)

Shigellosis is a bacterial enteric disease transmitted among humans. The disease causes diarrhea (which may contain blood and mucous), fever, vomiting, nausea, and abdominal cramps. There may be mild and even asymptomatic cases. The usual means of transmission is by direct or indirect fecal-oral contamination from an infected person. A major factor in transmission is poor hygienic practices such as failure to wash hands and clean under the fingernails following defecation. The disease is more severe in children, elderly adults, and debilitated individuals.

The number of cases of shigellosis in Missouri reached the highest level in 1995 with 1,138 cases. In 1996, the number of cases fell to 387. In 1997, the number of cases continued to decline to 222. (See Figure 1.) Immunity following infection with shigella is of unknown duration, and increases in shigellosis cases, particularly in urban areas, may be associated with waning levels of protection. Thus, previously infected individuals could again be placed at risk, as well as cohorts of very young, previously unexposed children who are susceptible to infection.[1]

Twenty of the reported cases in 1997 were linked to two outbreaks. One of the outbreaks was community-wide and assumed to be caused by person-to-person transmission and the other occurred in a child care center.

The highest incidence occurred in those less than 5 years of age, with incidence rates of 30.4 per 100,000 in 1996 and 17.1 per 100,000 in 1997. (See Figure 2.)

The Southeastern health district had the highest incidence in both years, with a rate of 12.6 per 100,000 in 1996 and a rate of 10.8 per 100,000 in 1997. (See Figure 3.)

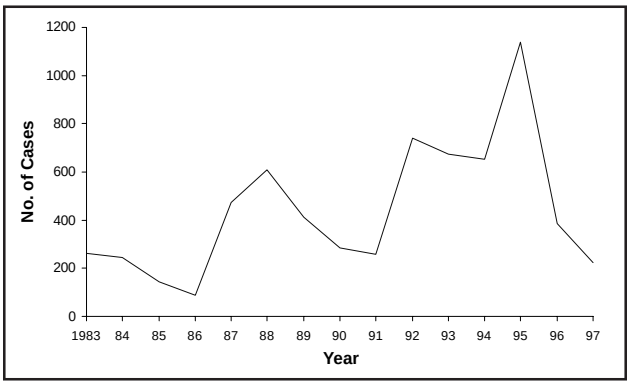


Figure 1. Shigellosis cases by year of report, Missouri, 1983-97

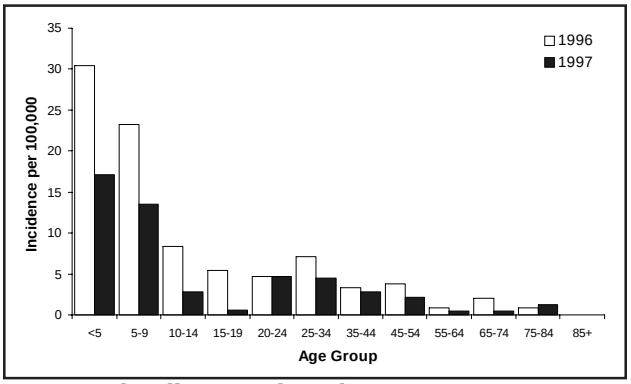


Figure 2. Shigellosis incidence by age group, Missouri, 1996 and 1997

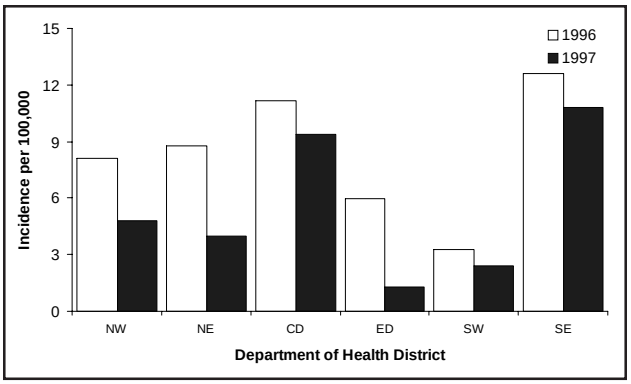


Figure 3. Shigellosis incidence by health district, Missouri, 1996 and 1997

Among the reported cases for 1996, 60 (15.5%) were hospitalized and no deaths were reported. In 1997, 48 cases (21.6%) were hospitalized and no deaths were reported.

Figure 4 shows the incidence rates by county in 1997.

There are four species of *Shigella* with many serotypes. Table 1 shows the isolates identified in Missouri by species.

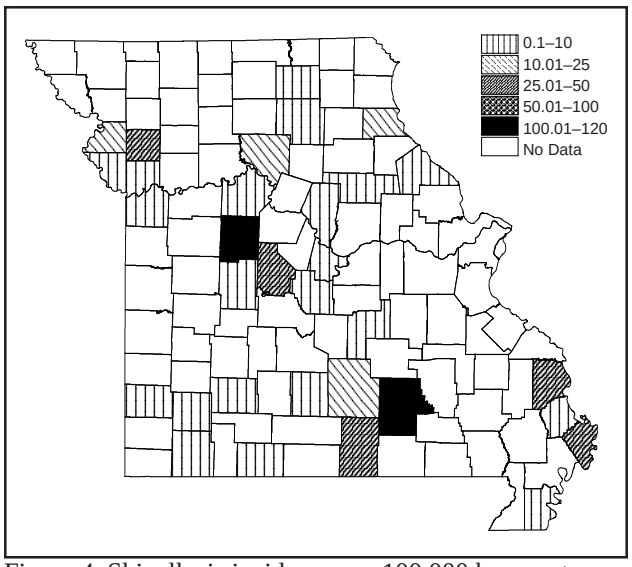


Figure 4. Shigellosis incidence per 100,000 by county, Missouri, 1997

REFERENCE:

1. Lee LA, Shapiro CN, Hargrett-Bean N, et al. Hyperendemic shigellosis in the United States: A review of surveillance data for 1967–1988. J Infect Dis 1991;164:894–900.

Table 1. *Shigella* species identified in Missouri, 1996 and 1997

Species	1996	1997
S. sonnei	334 (86.3%)	163 (73.4%)
S. flexneri	14 (3.6%)	10 (4.5%)
S. dysenterieae	1 (0.3%)	0 (0.0%)
Unknown	38 (9.8%)	49 (22.1%)

Yersiniosis (*Yersinia enterocolitica*)

Yersiniosis is an acute bacterial enteric disease with the following signs and symptoms: acute watery diarrhea (especially in young children), enterocolitis, fever and vomiting. Less common symptoms include erythema nodosum, cutaneous ulcerations, osteomyelitis and septicemia. The *Yersinia* genus includes *Y. pestis*, the agent of plague, and numerous others, most of which are not pathogenic.

Yersinia enterocolitica is reportable in Missouri and presents most commonly with a gastroenterocolitis syndrome. There are over 50 serotypes and five biotypes of *Y. enterocolitica*, many of which are nonpathogenic.

The pig is the principal reservoir of pathogenic *Y. enterocolitica*. Fecal-oral transmission occurs when contaminated food and drinks are consumed, or contact occurs with an infected person or animal. Although *Y. enterocolitica* has been isolated from a variety of foods, the pathogenic strains are most commonly isolated from raw pork products. It is able to grow and multiply in refrigerated and microaerophilic conditions, so there is an increased risk of infection if uncured meat is stored undercooked.

The number of yersiniosis cases rose steadily since 1985, peaked in 1991, and is declining slowly in a see-saw pattern. In Missouri, the number of cases rose 87.5 percent to 30 cases in 1997 from 16 cases in 1996. (See Figure 1.)

The highest incidence occurred in children under 5 years of age, with incidence rates of 2.9 per 100,000 in 1996 and 4.8 per 100,000 in 1997. The next highest incidence occurred in those 85 years and older, with a rate of 1.3 per 100,000 for 1996 and 1997. (See Figure 2.)

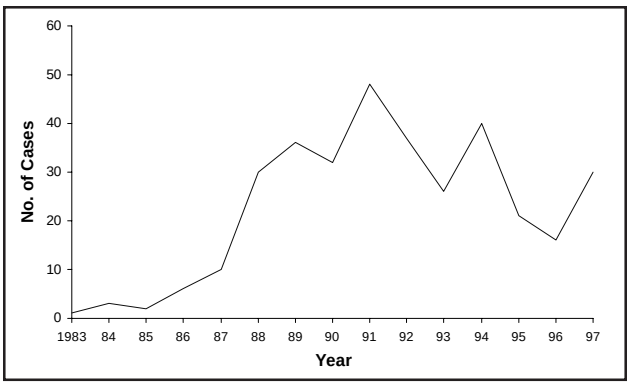


Figure 1. Yersiniosis cases by year of report, Missouri, 1983–97

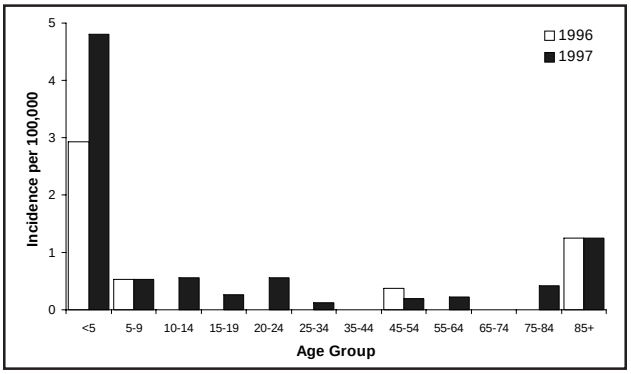


Figure 2. Yersiniosis incidence by age group, Missouri, 1996 and 1997

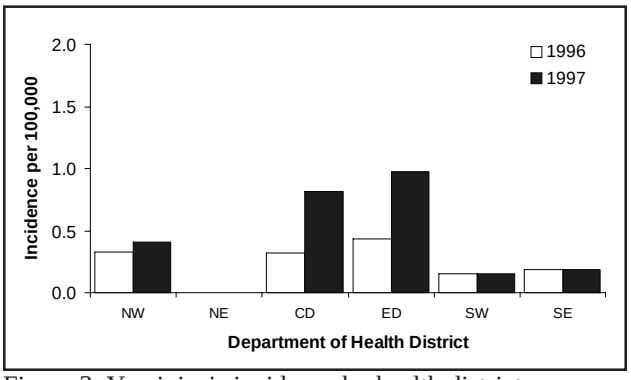


Figure 3. Yersiniosis incidence by health district, Missouri, 1996 and 1997

The Eastern health district, which includes St. Louis, had the highest incidence in both years, with a rate of 0.4 per 100,000 in 1996 and 1.0 per 100,000 in 1997. (See Figure 3.)

A high proportion of the cases reported occurred in African-Americans, 9 (56%) in 1996 and 15 (50%) in 1997.

Among the cases reported in 1996, 6 (37.5%) were hospitalized. One death was reported for a case fatality rate of 62.5 per 1,000. In 1997, 9 (30.0%) were hospitalized and no deaths were reported.

Studies have found cases of yersiniosis associated with household consumption of chitterlings (small intestine of pigs), so physicians need to be aware of this illness among infants in black households, especially during traditional holiday periods.

Figure 4 shows the incidence rates by county in 1997.

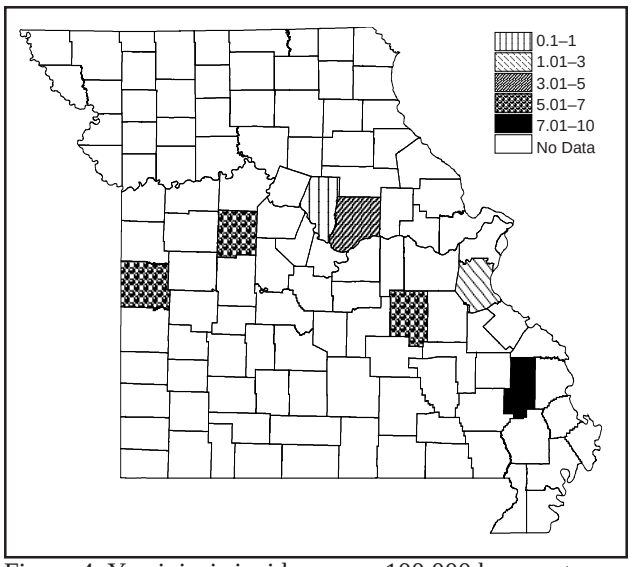


Figure 4. Yersiniosis incidence per 100,000 by county, Missouri, 1997

Diseases of the Nervous System

Aseptic Meningitis (Viral meningitis, non-bacterial meningitis)

Aseptic meningitis is a common disease syndrome with multiple etiologies of viral origin. The disease is characterized by the sudden onset of fever with signs of meningeal involvement, and CSF laboratory findings of pleocytosis, increased levels of protein, normal sugar and the absence of bacteria in the cerebrospinal fluid.

In the United States, the majority of cases of aseptic meningitis are caused by enteroviruses (picornavirus). The incidence of specific types of viruses varies with geographic location and time.

In Missouri, reports of aseptic meningitis have declined in an undulating pattern from a plateau in 1991–1993. In 1996, 120 cases were reported and in 1997, 99 cases were reported. Aseptic meningitis is not designated as a nationally notifiable disease. Cases may not be identified and reported except when epidemic or cluster cases occur. (See Figure 1.)

The highest incidence occurred in those less than 5 years of age in 1996, with a rate of 6.1 per 100,000. In 1997, the highest incidence occurred in the 20–24 age group with a rate of 3.3 per 100,000. (See Figure 2.)

The Northwestern health district had the highest incidence in 1996, with a rate of 3.8 per 100,000. In 1997, the Northeastern health district had the highest incidence with a rate of 3.6 per 100,000. (See Figure 3.)

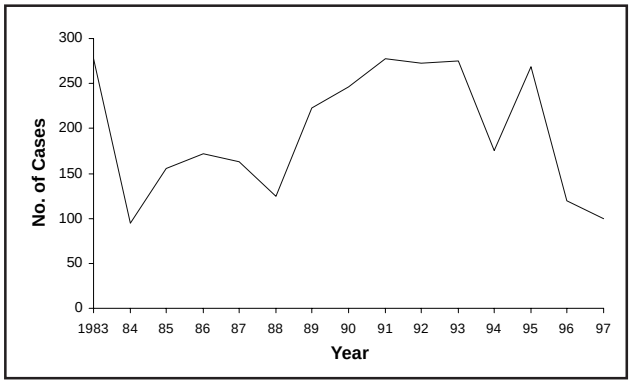


Figure 1. Aseptic meningitis cases by year of report, Missouri, 1983–97

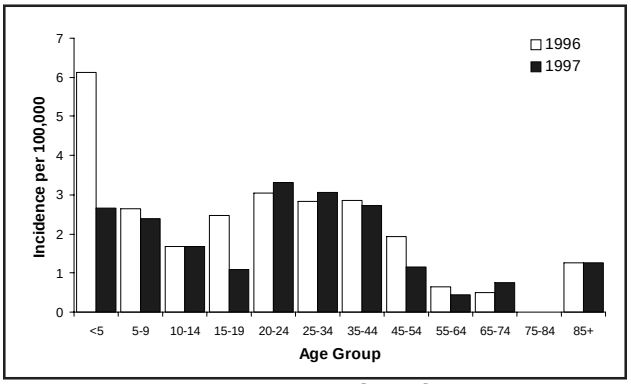


Figure 2. Aseptic meningitis incidence by age group, Missouri, 1996 and 1997

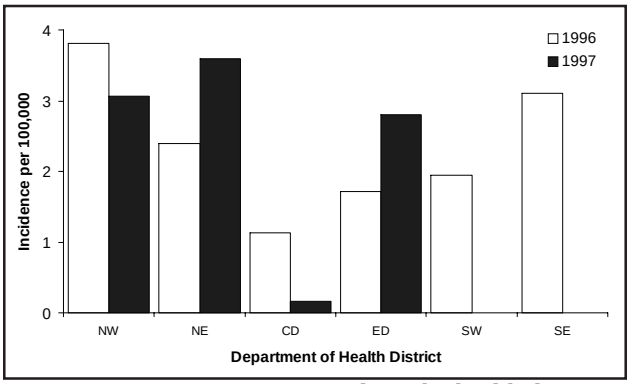


Figure 3. Aseptic meningitis incidence by health district, Missouri, 1996 and 1997

Figure 4 shows the incidence rates by county in 1997.

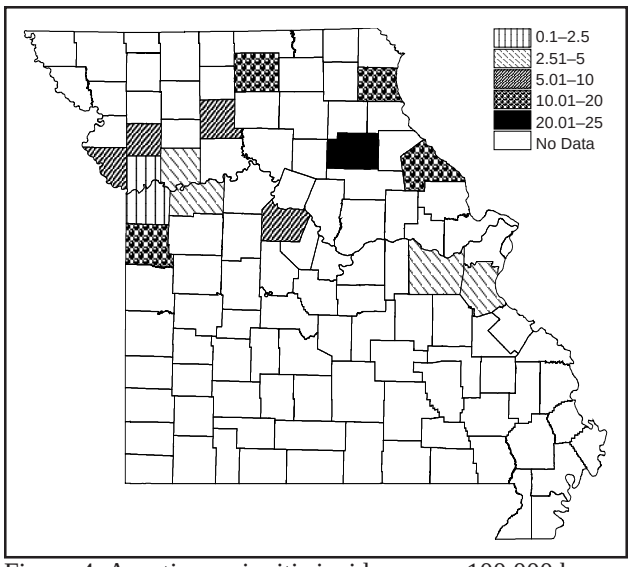


Figure 4. Aseptic meningitis incidence per 100,000 by county, Missouri, 1997

Meningococcal Disease

Meningococcal disease is an acute bacterial illness generally resulting in meningococcemia and/or meningitis. Meningococcal meningitis is reported most often, and is characterized by sudden onset of fever with severe headaches, nausea and/or vomiting, and stiff neck. Meningococcal septicemia (bloodstream infection) has an abrupt onset of fever, chills, prostration, and a petechial rash. In severe cases, the rash is purpural and the disease may progress rapidly to shock, coma and death despite appropriate antibiotic therapy. Other complications include septic arthritis, pneumonia, conjunctivitis and myocarditis.

The infectious agent is *Neisseria meningitidis* which is carried in the human nasopharynx. A carrier rate of ≥15 percent may occur in the population without any cases of disease. Greatest incidence of disease occurs in the winter and spring. The organism is transmitted by direct contact with oral/pharyngeal secretions, including respiratory droplets from the nose and throat. The incubation period varies from two to ten days, usually three to four days. Meningococcal meningitis occurs most often in very small children and young adults. Individuals lacking certain complement components are at risk to contract or have recurrence of this disease.

In Missouri, only meningococcal meningitis was reportable through 1993. Figure 1 shows the 15-year trend for meningococcal meningitis with an average of 41 cases per year being reported in the state.

In 1994, the reporting rule was amended to include other invasive meningococcal illnesses (e.g., meningococcal septicemia, pneumonia). In 1996, there were 57 cases of meningococcal meningitis and 41 cases of other meningococcal illness reported, for a total of 98 cases of meningococcal disease. In 1997, 43 cases of meningococcal meningitis and 63 cases of other meningococcal illness were reported for a total of 106 cases of meningococcal disease.

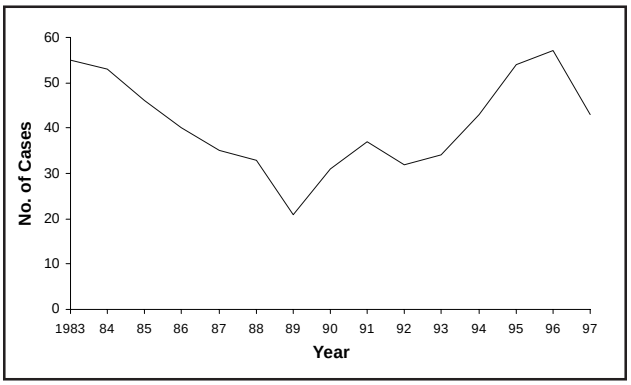


Figure 1. Meningococcal meningitis cases by year of report, Missouri, 1983–97

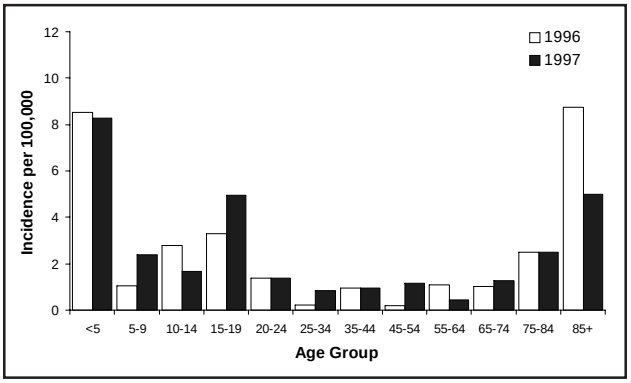


Figure 2. Meningococcal disease incidence by age group, Missouri, 1996 and 1997

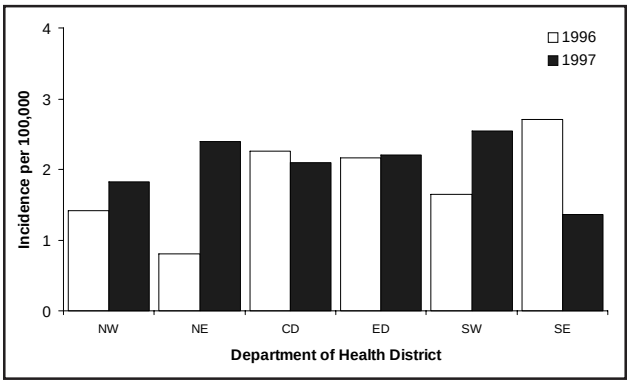


Figure 3. Meningococcal disease incidence by health district, Missouri, 1996 and 1997

The highest incidence of meningococcal disease continues to occur in those less than 5 years of age, with incidence rates of 8.5 per 100,000 in 1996 and

8.3 per 100,000 in 1997. (See Figure 2.) In 1996, those 85 years of age and older had a high incidence rate of meningococcal disease cases (8.8 per 100,000 compared to 5.0 per 100,000 in 1997).

The Southeastern health district had the highest incidence in 1996 with a rate of 2.7 per 100,000. In 1997, the Southwestern health district had the highest incidence with a rate of 2.6 per 100,000. (See Figure 3.)

Figure 4 shows the incidence rates of meningococcal disease by county in 1997.

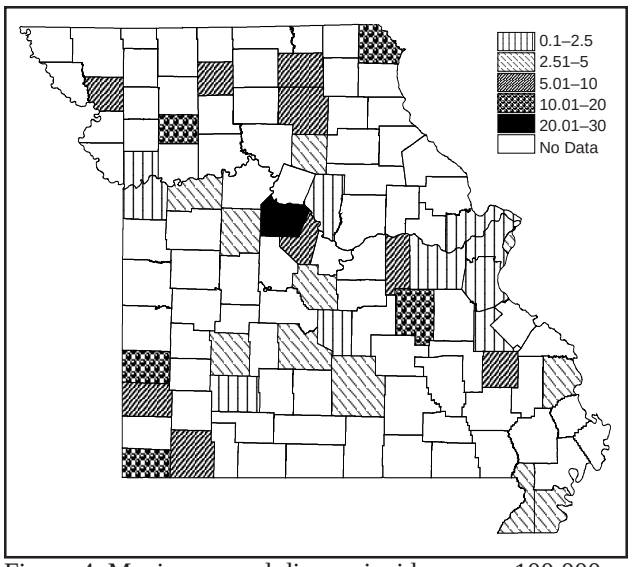


Figure 4. Meningococcal disease incidence per 100,000 by county, Missouri, 1997

Hepatitis

Viral Hepatitis

Viral hepatitis is a collective term used to describe inflammation of the liver resulting from a viral infection. Presently, there are six different viruses of viral hepatitis recognized in the United States: A, B, C, D, E and G. Four of these conditions are reportable to the Missouri Department of Health (A, B, C and viral non A non B non C).

Hepatitis E occurs primarily in countries with inadequate environmental sanitation. In the United States and other developed countries, hepatitis E cases have been documented only among travelers returning from hepatitis E endemic areas. Hepatitis G often appears with and has risk factors and modes of transmission similar to hepatitis C. It is estimated that hepatitis G accounts for 10–15 percent of cases reported as non ABC hepatitis.

Although the symptoms of acute disease do not differ with the causative agent, the effects of the diseases are quite different over time.

Viral Hepatitis A (Infectious Hepatitis, Epidemic Hepatitis, Epidemic Jaundice, Type A Hepatitis , HAV)

Of all the forms of viral hepatitis, hepatitis A and E are the only ones transmitted by the fecal-oral route. The infectious agent of hepatitis A is found in the stool, reaches peak levels one to two weeks prior to the onset of symptoms, and declines rapidly after liver dysfunction or symptoms appear. The usual mode of transmission is through direct person-to-person contact with an infected person, including sexual contact and the sharing between users of both injectable and inhalable drugs. Common source outbreaks have been attributed to contaminated water and food handled by infected persons, and raw or under-cooked shellfish harvested from contaminated waters. The incubation period is 15–50 days, with an average of 28–30 days.

Symptoms include fever, malaise, anorexia, nausea, abdominal discomfort and jaundice. The severity of the disease ranges from mild illness lasting one to two weeks, to a severe disabling illness lasting several months. Asymptomatic and mild infection is common, especially in children.

In 1996, there were 1,414 reported cases of hepatitis A, resulting in an incidence rate of 27.6 per 100,000. In 1997, the number declined slightly to 1,151 reported cases, for a rate of 22.5 per 100,000. (See Figure 1.)

In 1996, the highest incidence occurred in the 25–34 year age group, with an incidence rate of 46.3 per 100,000. In 1997, the highest incidence occurred in the 20–24 year age group, with an incidence rate of 41.2 per 100,000. (See Figure 2.)

The Southwestern health district had the highest incidence of hepatitis A in 1996 and 1997 with rates of 94.2 and 78.5 per 100,000, respectively. This reflects an area-wide outbreak. (See Figure 3.)

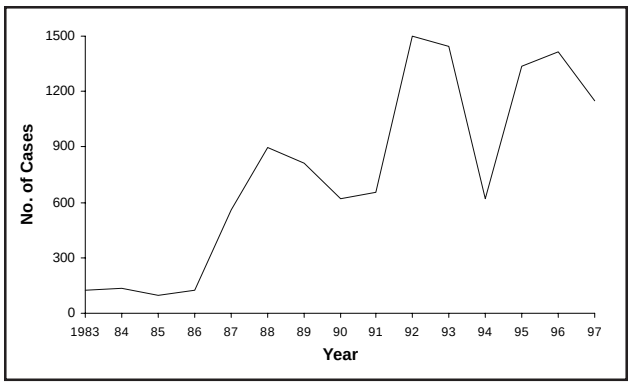


Figure 1. Hepatitis A cases by year of report, Missouri, 1983–97

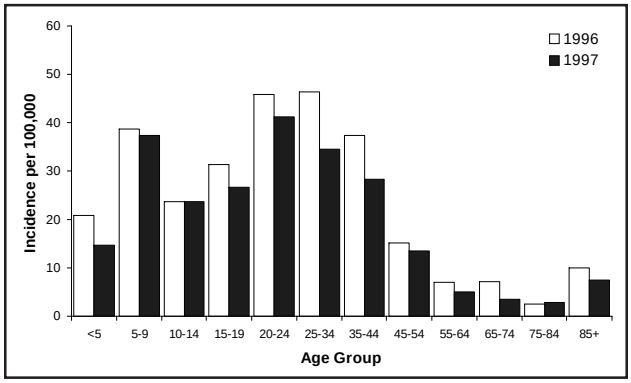


Figure 2. Hepatitis A incidence by age group, Missouri, 1996 and 1997

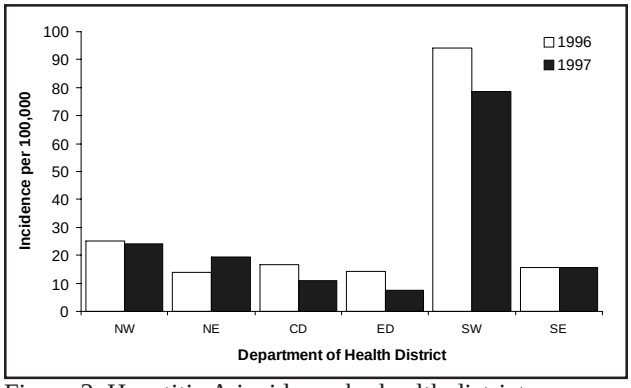


Figure 3. Hepatitis A incidence by health district, Missouri, 1996 and 1997

Among the cases reported in 1996, 236 (16.7%) were hospitalized. Two deaths were reported for a case fatality rate of 1.4 per 1,000. In 1997, 178 (15.5%) were hospitalized and no deaths were reported.

Figure 4 shows the incidence rates by county in 1997.

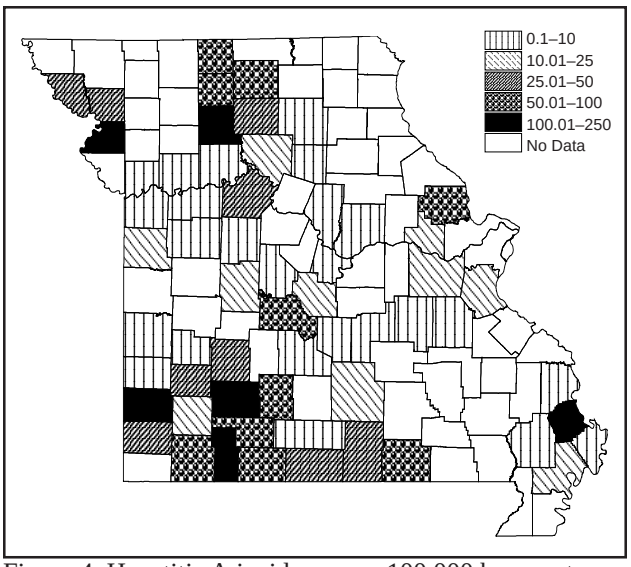


Figure 4. Hepatitis A incidence per 100,000 by county, Missouri, 1997

Viral Hepatitis B (Type B Hepatitis, Serum Hepatitis, HBV)

Hepatitis B is the most common form of bloodborne hepatitis. The virus is transmitted via direct contact with infectious blood and body fluids. The hepatitis B antigen is found in virtually all body secretions and excretions, however, only blood, saliva, semen, and vaginal fluids have been shown to be infectious. Infection can occur through sexual contact, IV drug use, occupational exposure in healthcare settings, perinatal exposure and household contact with a carrier.

In Missouri, there were 326 acute cases of hepatitis B reported in 1996 and 360 acute cases reported in 1997. Hepatitis B declined from 1989–1996 then increased slightly in 1997. (See Figure 1.)

The highest reported incidence in 1996 and 1997 was among the 25–34 age group, with a rate of 11.7 per 100,000 for 1996 and 12.3 for 1997. (See Figure 2.)

The Eastern health district had the highest incidence in 1996 with a rate of 9.2 per 100,000. In 1997, the Southwestern health district had the highest incidence with a rate of 11.2 per 100,000. (See Figure 3.) Testing of individuals for hepatitis A due to an outbreak of hepatitis A in the Southwestern health district has led to the increased discovery of hepatitis B cases. Figure 4 shows the incidence rates by county in 1997.

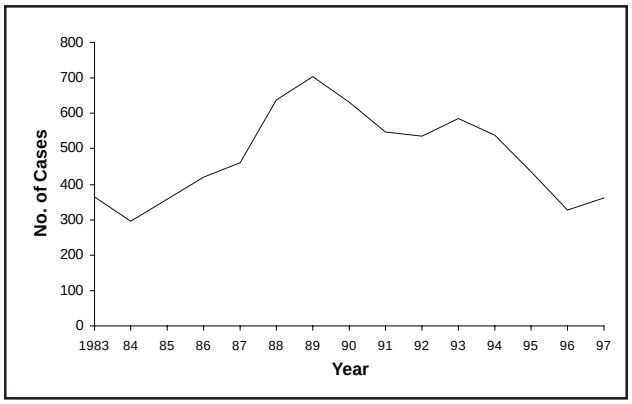


Figure 1. Hepatitis B cases by year of report, Missouri, 1983–97

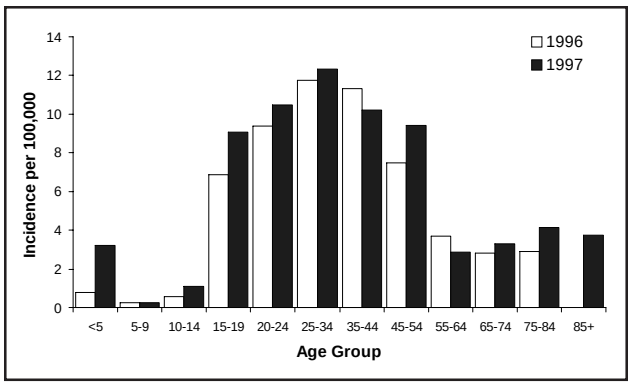


Figure 2. Hepatitis B incidence by age group, Missouri, 1996 and 1997

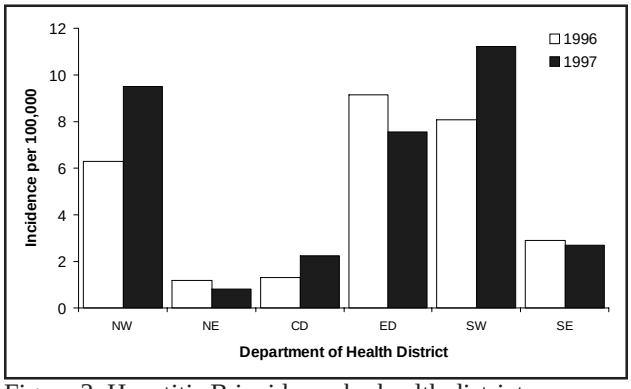


Figure 3. Hepatitis B incidence by health district, Missouri, 1996 and 1997

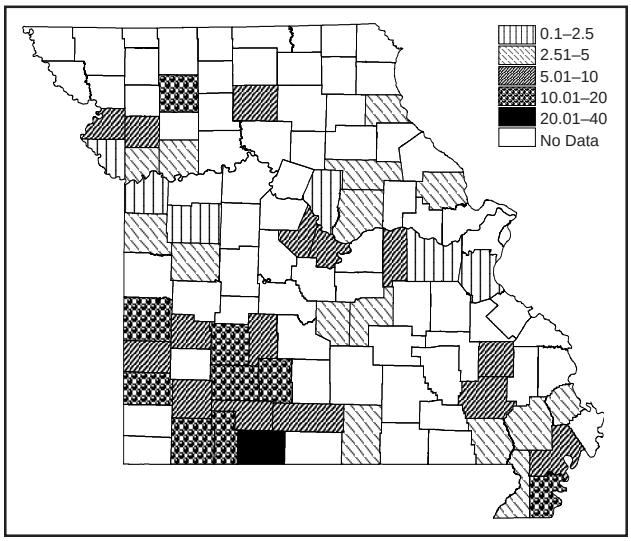


Figure 4. Hepatitis B incidence per 100,000 by county, Missouri, 1997

Among the cases reported in 1996, 52 (16.0%) were hospitalized and no deaths were reported. In 1997, 63 (17.5%) were hospitalized and three deaths from acute disease were reported for a case fatality rate of 8.3 per 1,000.

Hepatitis B Surface Antigen (HBsAg) Positive Pregnant Women Only

In 1993, the Missouri legislature amended state statute 210.030 to require blood testing of pregnant women for hepatitis B. This law also requires the administration of the appropriate doses of hepatitis B vaccine and HBIG within 12 hours of birth to infants born to mothers who are hepatitis B positive. The Department of Health's reporting rule (19 CSR 20-20.020) was amended to make positive results from hepatitis B screening of pregnant women (prenatal HBsAg) reportable effective March 30, 1995.

Because infants born to HBsAg-positive mothers are at higher risk of chronic hepatitis B infection, there is a compelling reason to track these infants. When a report of a HBsAg-positive pregnant woman is received, contacts (household, sexual or needlesharing) are identified by the woman. Contacts are then offered testing and provided HBIG and hepatitis B vaccine as medically indicated. Infants born to HBsAg-positive mothers are given HBIG and the three-dose vaccine series. Three to six months after the newborn has completed the vaccine series, a follow-up serology (anti-HBs) is offered. Follow-up of all contacts typically requires 12–18 months to complete.

In 1996, 60 HBsAg-positive pregnant women were reported in Missouri. (See Figure 1.) Figure 2 shows those reports by race. Asians had the highest incidence rate per 1,000 known deliveries at 16.9 compared with African Americans at 1.6, Whites at 0.4, and Hispanics at 0.6.

Follow-up identified 133 contacts, 54 of whom were screened for total core antibody (anti-HBc). Of those screened, 23 tested positive and treatment was not warranted. Of the remaining 110 contacts, 64 completed the hepatitis B vaccine series and 46 refused vaccination.

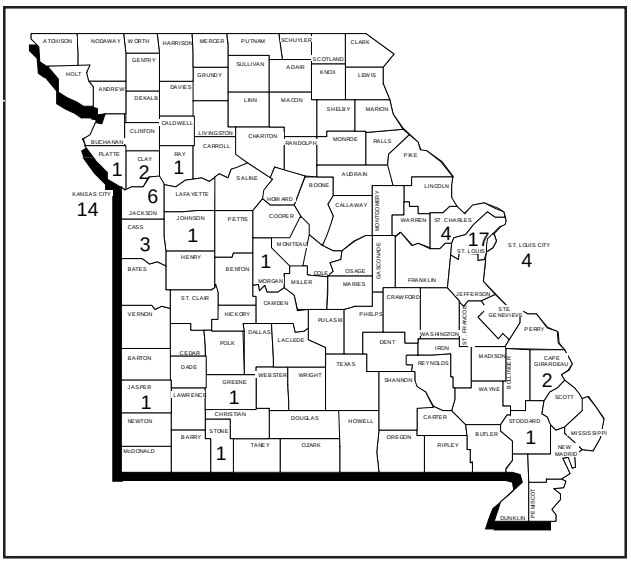


Figure 1. Reported HBsAg-positive pregnant women by county, Missouri, 1996

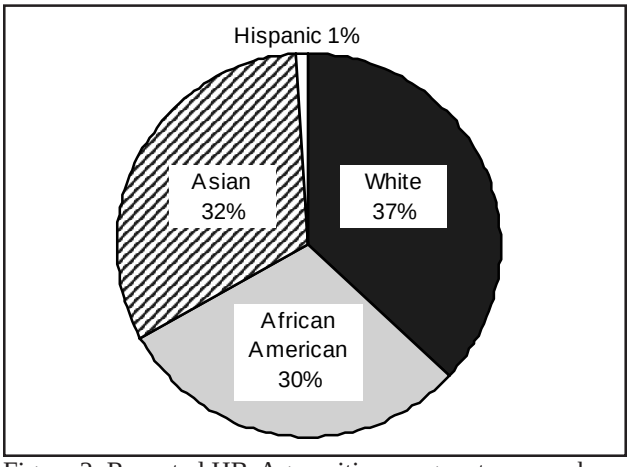


Figure 2. Reported HBsAg-positive pregnant women by race, Missouri, 1996

There were 56 live births to HBsAg-positive women in 1996. Of these, 52 infants (93%) completed their HBIG and vaccine series. Thirteen infants had post-vaccination anti-HBs screening. Twelve infants tested positive, indicating protective antibody levels, and one tested HBsAg-positive/anti-HBc-positive, indicating vaccine failure.

In 1997, 73 HBsAg-positive pregnant women were reported in Missouri. (See Figure 3.) Figure 4 shows those reports by race. Asians had the

highest incidence rate per 1,000 known deliveries at 23.2 compared with African Americans at 2.4, Whites at 0.3, and Unknown at 2.4.

Follow-up identified 115 contacts, 54 of whom were screened for total core antibody (anti-HBc). Of those screened, 24 tested positive and treatment was not warranted. Of the remaining 91 contacts, 60 completed the hepatitis B vaccine series and 31 refused vaccination.

There were 53 live births to HBsAg-positive women in 1997. Of these, 44 infants (83%) completed their HBIG and vaccine series. Twenty-eight infants had post-vaccination anti-HBs screening. Twenty-seven infants tested positive, indicating protective antibody levels, and one tested HBsAg-positive, indicating vaccine failure.

Based upon estimates from the Centers for Disease Control and Prevention, Missouri should have an average of 118 HBsAg-positive pregnant women reported each year. Since only 60 reports were received in 1996 and 73 reports in 1997, HBsAg-positive women are undoubtedly underreported in Missouri. Reliable information regarding the number of affected women depends upon several factors including:

- awareness of the risks and policies that address appropriate assessment, testing and interventions;
- access to qualified, valid laboratory services; and
- reliable reporting of results.

The success of the perinatal hepatitis B immunization program can be measured by its ability to effectively identify, track and monitor the population at risk and to assure appropriate interventions. Ultimately, prevention of hepatitis B in newborns depends on prompt, consistent reporting by laboratories, prenatal care providers and hospitals.

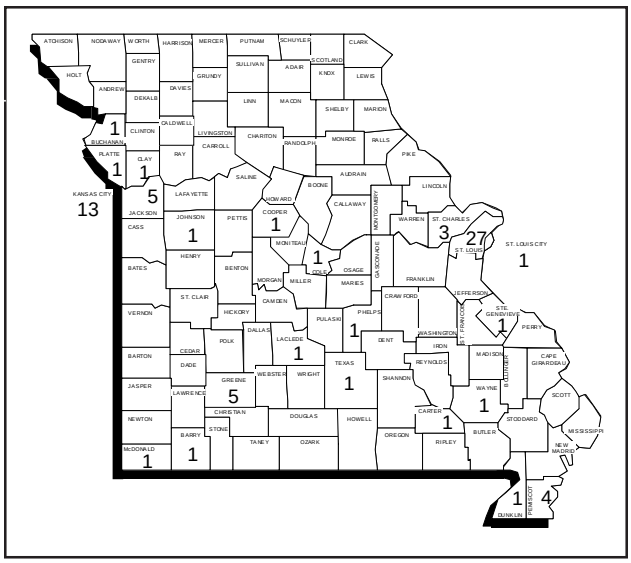


Figure 3. Reported HBsAg-positive pregnant women by county, Missouri, 1997

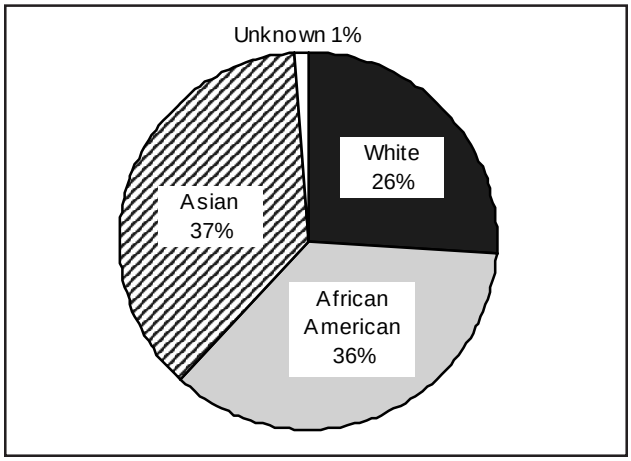


Figure 4. Reported HBsAg-positive pregnant women by race, Missouri, 1997

Viral Hepatitis C

Hepatitis C virus (HCV) infection is the most common chronic bloodborne infection in the United States. An estimated 3.9 million (1.8%) Americans are infected with HCV. HCV infection occurs in persons of all ages, but the highest incidence of acute hepatitis C is found in persons aged 20–39 years with males slightly outnumbering females.

HCV is transmitted primarily through repeated puncturing of the skin with blood contaminated needles/other sharps.

The Centers for Disease Control and Prevention (CDC) require, for reporting purposes, that hepatitis C be clinically apparent (acute). In addition to clinical signs and symptoms of hepatitis, the following laboratory results are required for the surveillance case definition:

- liver enzymes greater than 2.5 times the upper limit of normal, and
- blood negative for hepatitis A (IgM antiHAV negative) and hepatitis B (IgM anti-HBsAg negative or IgM anti-HBc negative), and
- blood positive for HCV antibody that is verified by supplemental testing (PCR, Riba).

This is problematic because clinical symptoms of acute disease tend to be mild or nonexistent.

In 1997, only six out of numerous cases reported to the Missouri Department of Health met the CDC definition for acute hepatitis C.

Non A Non B Hepatitis (NANB)

Non A Non B (NANB) hepatitis remains a diagnosis of exclusion and includes signs and symptoms of acute hepatitis with the following laboratory results:

- negative test results for hepatitis A (IgM anti-HAV negative), B (IgM anti-HBc negative or HBsAg negative), and C (Anti-HCV negative), and
- an increase in liver enzyme tests to two and one-half times the upper limit of normal.

Prior to 1997, hepatitis C was included in case counts for hepatitis non A non B. Starting in 1997, hepatitis C is being tracked as a separate disease. In Missouri, 23 cases met the above CDC case definition for acute NANB hepatitis in 1996 with only 4 cases meeting the case definition in 1997. (See Figure 1.)

The highest reported incidence of NANB hepatitis occurred in the 35–44 year old age group in 1996 and 1997, with an incidence rate of 1.4 per 100,000 and 0.4 per 100,000 respectively. (See Figure 2.)

The Southwestern health district had the highest incidence in 1996 with a rate of 0.9 per 100,000. The Southeastern health district had the highest incidence in 1997 with a rate of 0.4 per 100,000. (See Figure 3.)

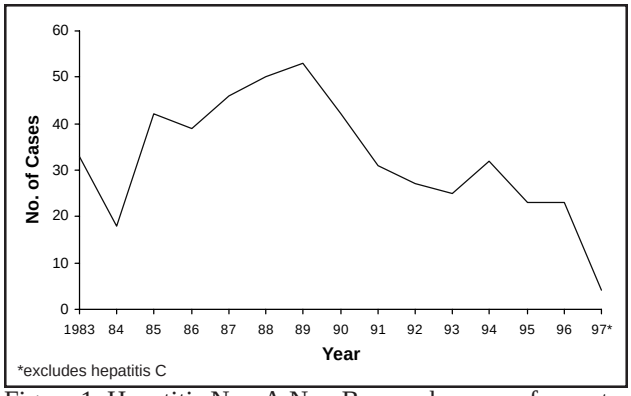


Figure 1. Hepatitis Non A Non B cases by year of report, Missouri, 1983–97

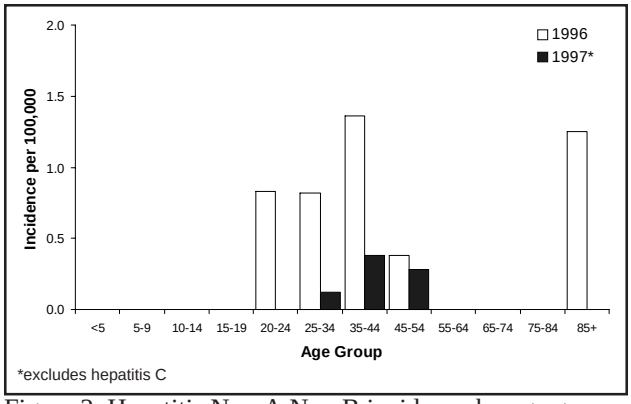


Figure 2. Hepatitis Non A Non B incidence by age group, Missouri, 1996 and 1997

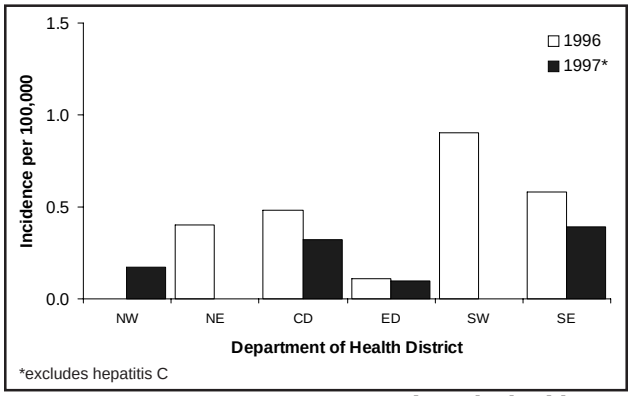


Figure 3. Hepatitis Non A Non B incidence by health district, Missouri, 1996 and 1997

Vaccine-Preventable Diseases

Diphtheria

Diphtheria is an acute bacterial disease of the tonsils, pharynx, larynx and nose, occasionally of other mucous membranes or skin, and sometimes the conjunctivae or genitalia. The characteristic lesion, caused by the release of a specific cytotoxin, is an adherent grayish membrane with a surrounding inflammation.

The infectious agent is *Corynebacterium diphtheriae,* which produces the cytotoxin. A disease of colder months in temperate zones, it involves primarily unimmunized children under 15 years of age, but is also found among adult populations in which immunization was neglected. Formerly a common disease, it has largely disappeared in areas where effective immunization programs have been carried out. The disease is transmitted from person to person through droplets from the respiratory system and through contact with the lesion or articles contaminated with the discharges from cases or carriers.

In Missouri, there have been no reported cases of diphtheria since 1979.

Haemophilus influenzae, type b (Hib)

Haemophilus influenzae has been a leading cause of serious systemic bacterial disease in the United States. It was the most common cause of bacterial meningitis, accounting for an estimated 8,000–11,000 cases annually until the early 1990s. *H. influenzae* meningitis occurs primarily among children less than 5 years of age. The mortality rate is two to eight percent, even with currently available antimicrobial therapy, and neurologic sequelae are observed in as many as 15–45 percent of survivors. Most cases of *H. influenzae* meningitis among children are caused by strains of type b (Hib). Symptoms of the Hib meningitis syndrome may include the following: fever, vomiting, lethargy and meningeal irritation in infants and stiff neck and back in older children. Progressive stupor or coma is common and occasionally there is a low-grade fever with central nervous system involvement.

In addition to bacterial meningitis, Hib is responsible for other invasive diseases, including epiglottitis, sepsis, cellulitis, septic arthritis, osteomyelitis, pericarditis and pneumonia. Non-typable strains of *H. influenzae* colonize the human respiratory tract and are a major cause of otitis media and respiratory mucosal infection, but rarely result in bacteremic disease. Hib is spread by droplets and discharges from the nose and throat.

In Missouri, the incidence of *H. influenzae* type b meningitis has decreased since the introduction of vaccines to zero cases in 1996 and one case in 1997. (See Figure 1.)

The new conjugate vaccines are effective in the very young as demonstrated by the reduction in the number of cases in that age group.

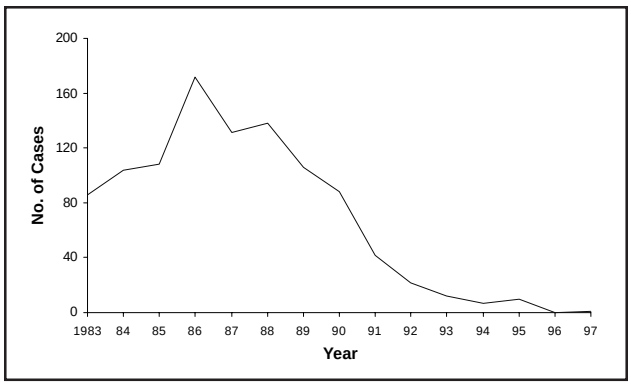


Figure 1. Hib meningitis cases by year of report, Missouri, 1983–97

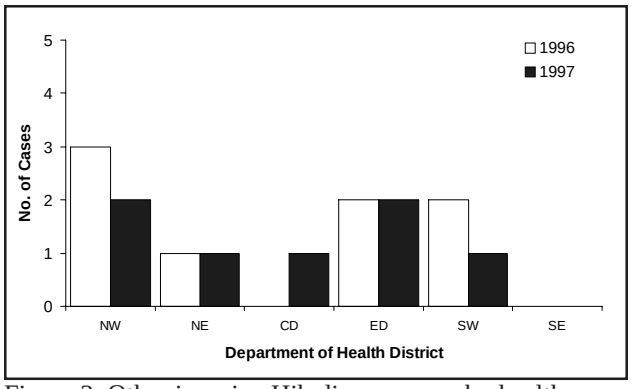


Figure 2. Other invasive Hib disease cases by health district, Missouri, 1996 and 1997

Invasive Hib disease other than meningitis became reportable in Missouri in 1990. There were 8 cases reported in 1996 and 7 reported in 1997. (See Figure 2.)

Influenza

Influenza is an acute viral disease of the respiratory tract. Symptoms include sudden onset of fever, sore throat, muscle aches, general weakness, and a nonproductive cough. Influenza is highly contagious and is spread by direct contact with an infected person or by airborne droplets when an infected person sneezes, coughs or talks. Persons are most infectious during the 24 hours before symptoms develop and may be infectious for up to seven days (usually 3–5 days from onset of symptoms). The incubation period is usually one to three days.

Epidemics of influenza can rapidly evolve with widespread morbidity and serious complications, including viral and bacterial pneumonia. The mortality rate is usually higher in the elderly and those debilitated by chronic cardiac, pulmonary, renal or metabolic disease, anemia, or immunosuppression.

The first laboratory-confirmed case of the 1996–97 season was reported on September 23, 1996. There were 417 laboratory-confirmed cases of influenza reported during the 1996–97 season. Three hundred and sixty (86%) were type A, with 62 subtyped as H3N2. There were fifty-seven (14%) cases of type B influenza reported. Confirmed influenza A cases peaked during week 52 and influenza B peaked during week 12. (See Figure 1.)

Reports of influenza-like illness peaked during week 51 of 1996, one week prior to the confirmed influenza A peak, and then declined to baseline levels by week 3 of 1997. (See Figure 2) Pneumonia and influenza deaths fluctuated around the previous 13-year average, with a notable increase observed week 2 through week 7. (See Figure 3.) Outbreaks during the 1996–97 season were located in the following settings: six in long term care facilities; eight in elementary and secondary schools; one in a university; two community-wide outbreaks; one in an office setting; and one in a job training institution. (NOTE: The training institution was a JOB CORP.) All of the elementary and secondary school outbreaks occurred prior to the Christmas break.

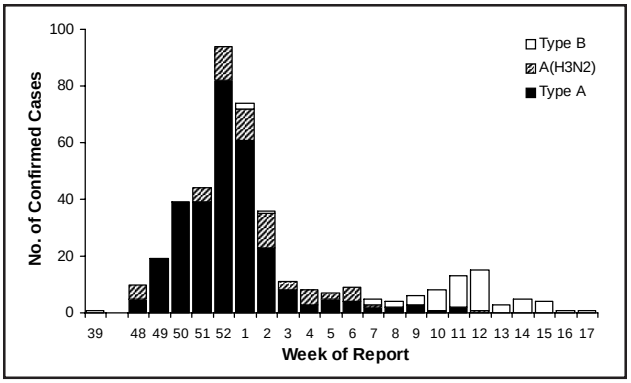


Figure 1. Laboratory-confirmed influenza cases by week of report, Missouri, 1996–97 season

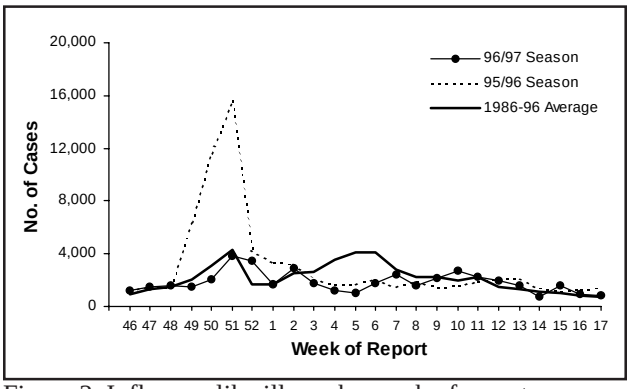


Figure 2. Influenza-like illness by week of report, Missouri, 1996/97, 1995/96 and 1986–96 average

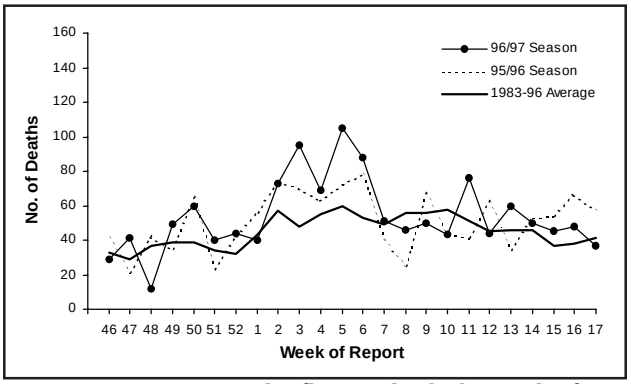


Figure 3. Pneumonia and influenza deaths by week of report, Missouri, 1996/97, 1995/96 and 1983–96 average

The first influenza cases for the 1997–98 season were reported on November 18, 1998, and were subtyped as influenza A/Wuhan/395/95-like (H3N2). There were 1,462 laboratory confirmed cases of influenza reported in Missouri during the 1997–98 season. The increased number of confirmed cases could be a reflection of increased reporting of the in-vitro enzyme immunoassay (EIA) direct rapid detection tests for influenza A used by many Missouri hospitals and laboratories. Of the laboratory confirmed cases, 1,459 (99.8%) were type A, with 99 subtyped as H3N2. There were three (0.2%) confirmed cases of type B influenza. (See Figure 4.)

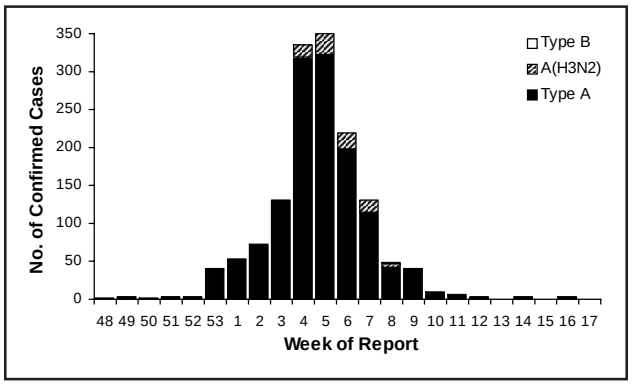


Figure 4. Laboratory-confirmed influenza cases by week of report, Missouri, 1997–98 season

The number of cases of influenza-like illness reported for the 1997–98 season was 71,351, considerably higher than the 44,678 reported during the 1996–97 season. Influenza-like illness incidence peaked during week 4. (See Figure 5.) The total number of pneumonia and influenza deaths for the 1997–98 season was 1,496, a 15.5 percent increase over the 1,295 deaths reported during the 1996–97 season. The number of pneumonia and influenza deaths rose above the previous 10-year average during week 1 through week 13, and peaked during week 9. Additional peaks above the previous 10-year average also occurred during weeks 47, 49, 50, 51 and 16. (See Figure 6.) Many outbreaks of influenza-like illness were reported during the 1997–98 season. The outbreaks were located in the following settings: 29 schools; one university (confirmed as type A, subtyped as H3N2); three communities (one confirmed as type A, subtyped as H3N2); and three correctional facilities (two confirmed as type A, subtyped as H3N2) .

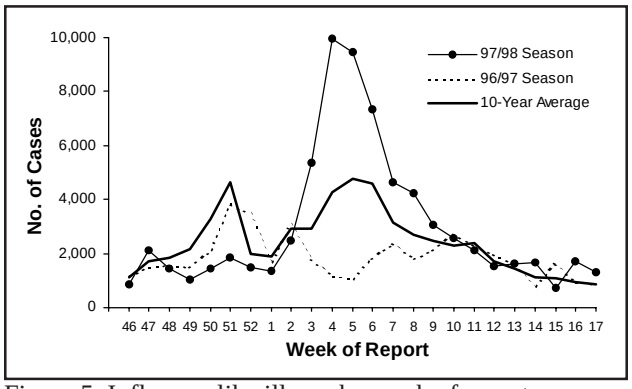


Figure 5. Influenza-like illness by week of report, Missouri, 1997/98, 1996/97 and 1987–97 average

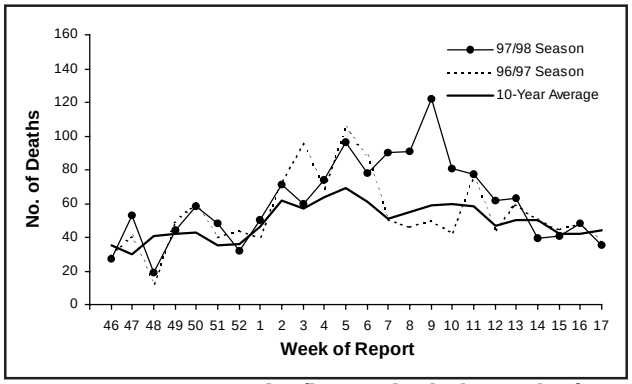


Figure 6. Pneumonia and influenza deaths by week of report, Missouri, 1997/98, 1996/97 and 1987–97 average

Measles (Rubeola, Hard Measles, Red Measles, Morbilli)

Measles is an acute, highly communicable viral disease. The mode of transmission is by airborne droplet spread, direct contact with nasal or throat secretions of infected persons and, less commonly, by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.

From exposure to onset of prodrome averages 10–12 days. From exposure to rash onset averages 14 days. All persons who have not had the disease or been successfully immunized are susceptible. Acquired immunity after disease is permanent. Infants born of mothers who have had the disease are immune for approximately the first six to nine months or more. Vaccination at age 12–15 months produces immunity in 95–98 percent of recipients; revaccination may produce immunity levels as high as 99 percent.

Missouri experienced low incidence of measles in the years 1981–88, with an average of 30 cases reported per year. In 1989, there was a dramatic increase to 671 reported cases. (See Figure 1.) There were no measles outbreaks in 1996 or 1997. Three cases of measles were reported in 1996; two of the three cases were epidemiologically linked to an index case in the State of Nevada. In 1997, there was one confirmed measles case reported in a 4-year-old with a documented history of MMR vaccination. The index case was not identified.

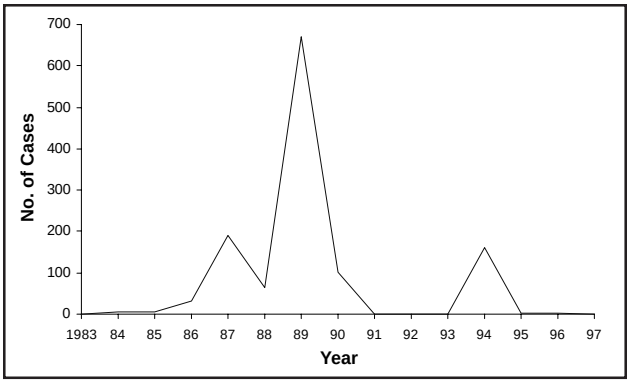


Figure 1. Measles cases by year of report, Missouri, 1983–97

One dose of live measles vaccine received by injection on or after the first birthday is required for school attendance for all children who began kindergarten prior to the 1990–91 school year. Since that time, all children beginning kindergarten who were 5/6 years of age at the beginning of the 1990–91 school year or thereafter are required to have two doses of live measles vaccine by injection. It is also recommended that all college freshman receive one dose of live measles vaccine prior to entering a college or university.

Mumps (Infectious parotitis)

Mumps is an acute viral disease characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. The central nervous system is often involved, usually as aseptic meningitis, almost always without sequelae. Other possible complications include encephalitis, orchitis, pancreatitis, neuritis, arthritis, mastitis, nephritis, thyroiditis and pericarditis. The mode of transmission is by droplet spread or direct contact with saliva of an infected person. The incubation period is about 12–25 days with an average of 18 days.

In Missouri, the 15-year trend shows that mumps incidence has been below 100 cases per year since 1983 with a peak of 87 cases occurring in 1989. There were 10 cases reported in 1996 and 0 cases in 1997. (See Figure 1.)

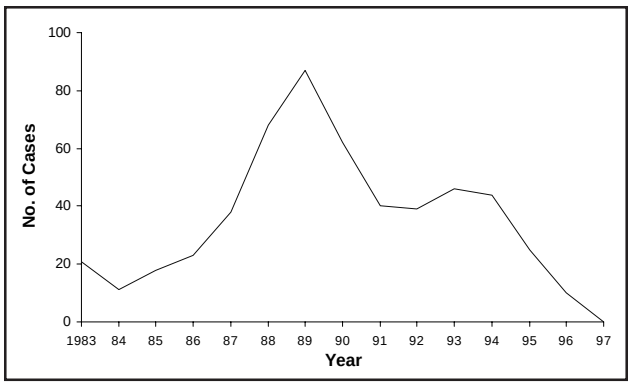


Figure 1. Mumps cases by year of report, Missouri, 1983–97

Pertussis (Whooping Cough)

Pertussis (whooping cough) is a highly contagious bacterial disease, involving the respiratory tract. Pertussis has an infection rate of up to 90 percent in non-immune household contacts. The disease is most often due to exposure to older siblings and adults with mild or atypical illness. During the first year of life, pertussis can be particularly severe , with complications that include pneumonia, seizures and encephalopathy. In infants less than 6 months of age, the case fatality rate is approximately one percent.

In Missouri, 74 cases of pertussis were reported in 1996; 80 in 1997. (See Figure 1.) One additional child under the age of 1 year who died of AIDS and its complications in 1997 also had pertussis. Cases occurred in all health districts of the state.

Incomplete immunization coverage is only one reason that cases of pertussis continue to occur. Babies may be infected by older children and adults whose immunity to pertussis has waned. Currently, vaccines are available only for children under 7 years of age, limiting the usefulness of vaccination as a measure for outbreak control. Continued research is underway to develop a pertussis vaccine that is safe and effective for those 7 years of age and older in order to further reduce the incidence of pertussis.

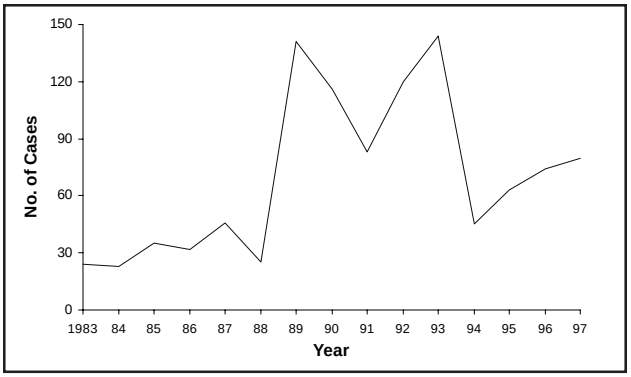


Figure 1. Pertussis cases by year of report, Missouri, 1983–97

Poliomyelitis, Acute (Polioviral fever, Infantile paralysis)

Poliomyelitis is an acute viral infection with severity ranging from inapparent infection to nonspecific febrile illness, aseptic meningitis, paralytic disease and death. Poliovirus types 1, 2 and 3 (genus *Enterovirus*) are all capable of causing infection, illness and paralysis.

Missouri has not had a case of poliomyelitis reported since 1988.

Not a single case of indigenous poliomyelitis has been reported in the United States since 1979. Efforts to eradicate poliomyelitis by the year 2000 continue. In 1995, the incidence of reported polio cases worldwide was 6,179. The Missouri Department of Health continues to support the current Advisory Committee on Immunization Practices (ACIP) recommendations on polio immunization.

Two polio vaccines are currently licensed in the United States: inactivated poliovirus vaccine (IPV) and oral poliovirus vaccine (OPV). The following schedules are acceptable according to ACIP, the American Academy of Pediatrics and the American Academy of Family Physicians:

- IPV at ages 2 and 4 months
  OPV at age 12–18 months
  and at age 4–6 years;
  OR
- IPV at ages 2 months, 4 months
  6–18 months and at age 4–6 years.

OPV is no longer recommended for the first two doses of the schedule unless there are special circumstances, such as: children of parents who do not accept the recommended number of injections, late initiation of immunization which would require an unacceptable number of injections, and imminent travel to polio-endemic areas. OPV remains the vaccine of choice for mass immunization campaigns to control outbreaks due to wild poliovirus.

Rubella (German Measles)

Rubella is a mild febrile disease with diffuse punctate and maculopapular rash, sometimes resembling that of measles or scarlet fever. Children usually present with no well-defined symptoms. However, adults may experience symptoms of low-grade fever, headache, malaise, mild coryza and conjunctivitis. Up to 50 percent of the infections can occur without rash.

Congenital rubella syndrome occurs in greater than 25 percent of the women who contract rubella during the first trimester of pregnancy. The risk of a single congenital defect falls to 10–20 percent by the 16th week of pregnancy, and congenital defects are rare when the infection occurs after the 20th week. Fetuses infected early are at the greatest risk of intrauterine death, spontaneous abortion and congenital malformation of major organ systems. Congenital defects can be single or multiple.

In Missouri, there were no reported cases of rubella nor of congenital rubella syndrome in 1996. There were two cases of rubella reported in 1997. (See Figure 1.)

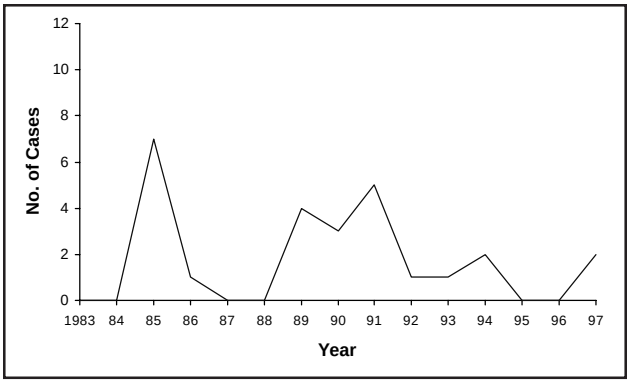


Figure 1. Rubella cases by year of report, Missouri, 1983–97

Sexually Transmitted Diseases

Chlamydia trachomatis Infections

Chlamydial infection, caused by *Chlamydia trachomatis*, is the most common bacterial sexually transmitted disease (STD). The infection is transmitted during vaginal or anal sexual contact with an infected partner. A pregnant woman may pass the infection to her newborn during delivery, resulting in eye infection or pneumonia in the infant.

Men and women with *C. trachomatis* infection may experience abnormal genital discharge or pain during urination. However, these symptoms may be absent or very mild, and it is estimated that approximately 75 percent of women and 50 percent of men have no symptoms.

The most important complication of chlamydial infection in women is pelvic inflammatory disease (PID). It is estimated that up to 40 percent of women with untreated chlamydia will develop PID. Of those with PID, 20 percent will become infertile; 18 percent will experience debilitating, chronic lower abdominal pain; and 9 percent will have a life-threatening ectopic (tubal) pregnancy. In men, a potential complication of chlamydial infection is epididymitis, which can result in infertility.

Chlamydial infection is treated with antibiotics such as a azithromycin or doxycycline. Pregnant women can be treated with drugs such as erythromycin or amoxicillin. All sex partners of a person with chlamydial infection must be evaluated and treated to prevent reinfection and further spread of the disease.[1,2,3]

In Missouri, the number of reported cases of sexually transmitted chlamydial infection was 12,052 in 1995. This number decreased by 0.9 percent to 11,935 in 1996, and then increased 2.5 percent to 12,247 cases reported in 1997. (See Figure 1.)

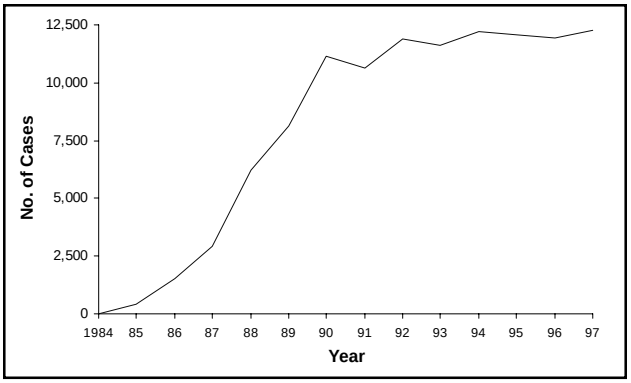


Figure 1. *Chlamydia trachomatis* cases by year of report, Missouri, 1984–97

Table 1. Reported Chlamydia Cases by Gender, Race, Age Group and Geographic Area, Missouri, 1996 and 1997.

	REPORTED 1996	REPORTED 1997	PERCENT CHANGE
GENDER			
MALES	1,379	1,504	9%
FEMALES	10,573	10,743	2%
RACE			
WHITE	3,261	3,273	0%
BLACK	4,601	4,880	6%
ASIAN	33	32	-3%
AMERICAN INDIAN	4	12	200%
OTHER/UNKNOWN	4,053	4,050	0%
AGE GROUP*			
<13	49	29	-41%
13–19	5,831	5,924	2%
20–29	4,960	5,319	7%
30–39	747	699	-6%
40–49	164	103	-37%
>49	49	34	-31%
GEOGRAPHIC AREA			
ST. LOUIS CITY	2,376	2,651	12%
ST, LOUIS COUNTY	2,010	2,195	9%
KANSAS CITY	3,161	2,657	-16%
OUTSTATE	4,405	4,744	8%
TOTAL	**11,952**	**12,247**	**2%**

*Excludes unknown ages
Note: Data excludes chlamydia ophthalmia cases.

In 1996, 10,573 (88.5%) of the 11,952 reported sexually transmitted chlamydia cases were in females and 1,379 (11.5%) were in males. In 1997, 10,743 (87.7%) of the 12,247 reported cases were in females and 1,504 (12.3%) were in males. The majority of the reported cases in 1996 and 1997 were in females because of selective screening for the disease in females (i.e., females are much more likely to be screened for chlamydia than males). If widespread screening of males were also

undertaken, the number of diagnosed and reported chlamydia cases in males would be much higher than is currently seen. Table 1 describes chlamydia cases reported in 1996 and 1997 by gender, race, age group, and geographic area.

In 1996, 4,906 (41.0%) of the 11,952 total reported cases of sexually transmitted chlamydia in Missouri were from the Missouri Infertility Prevention Project (MIPP)*, and in 1997, 4,920 (40.2%) of the 12,247 total reported cases were from the project. Of the 4,906 cases identified through the project in 1996, 4,341 (88.5%) were in females and 564 (11.5%) were in males. Of the 4,920 cases in 1997, 4,314 (87.7%) were in females and 605 (12.3%) were in males. In 1997, the MIPP screened 108,000 individuals for chlamydial infection and reported an overall positivity rate of 4.2 percent, down from 5.1 percent in 1996.

Widespread use of treatment based on clinical symptoms, dual treatment of gonorrhea cases (use of treatment regimens effective against both gonorrhea and chlamydial infection in any person diagnosed with gonococcal infection), and increased screening for chlamydia (since 1987) coupled with appropriate treatment may all be contributing to the flattening of the incidence curve for chlamydia since 1990.

REFERENCES:

1. CDC Division of STD Prevention. Some Facts About Chlamydia. **http://www.cdc.gov/nchstp/dstd/chlamydia_facts.htm**
2. National Institute of Allergy and Infectious Diseases. Fact Sheet: Chlamydial Infection, June 1998. **http://www.ama-assn.org/special/std/support/educate/stdclam.htm**
3. CDC. 1998 Guidelines for treatment of sexually transmitted diseases. MMWR 1998;47(No. RR-1). **http://www.cdc.gov/epo/mmwr/preview/ind98_rr.html**

* The Missouri Infertility Prevention Project (MIPP) is a collaborative effort implemented in 1993 with STD and family planning clinics to prevent infertility in females due to sexually transmitted diseases.

Gonorrhea

Gonorrhea is a sexually transmitted disease (STD) that is caused by the bacterium *Neisseria gonorrhoeae*. The infection is most commonly spread during sexual intercourse—vaginal, oral, and anal. Although in women the cervix usually is the initial site of infection, the disease can spread to and infect the uterus and fallopian tubes, resulting in pelvic inflammatory disease (PID). This can lead to infertility and ectopic (tubal) pregnancy. Gonorrhea can be passed from an infected woman to her newborn infant during delivery, causing eye infections in the baby.

The early symptoms of gonorrhea are often mild, and many women who are infected have no symptoms of the disease. The initial symptoms in women include a painful or burning sensation when urinating and/or vaginal discharge that is yellow or bloody. Men are more often symptomatic than women. They usually have a discharge from the penis and a burning sensation during urination. Symptoms of rectal infection include discharge, anal itching, and sometimes painful bowel movements.

Antibiotic medications used to treat gonorrhea include ceftriaxone, cefixime, ciprofloxacin, or ofloxacin. Gonorrhea can occur together with chlamydial infection, another common STD. Therefore, a patient diagnosed with gonorrhea should be given one of the medications mentioned above plus either doxycycline or azithromycin. This combination of antibiotics will treat gonorrhea and also, if present, chlamydial infection. All sex partners of a person with gonorrhea must be evaluated and treated to prevent reinfection and further spread of the disease.[1,2]

In Missouri, reported numbers of sexually transmitted gonorrhea cases decreased by 26 percent from 11,302 cases in 1995 to 8,415 cases in 1996, and then further decreased by 9.0 percent to 7,656 cases in 1997. (See Figure 1.) The rate of

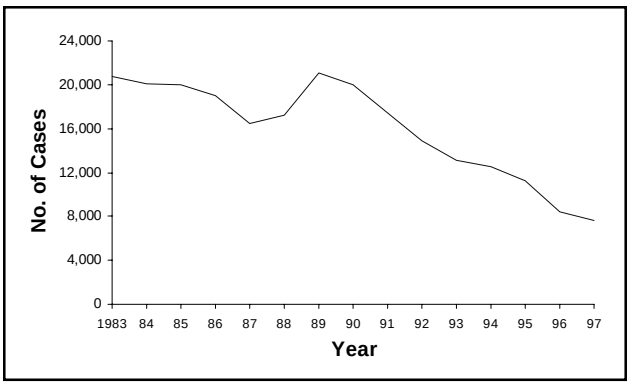


Figure 1. Gonorrhea cases by year of report, Missouri, 1983–97

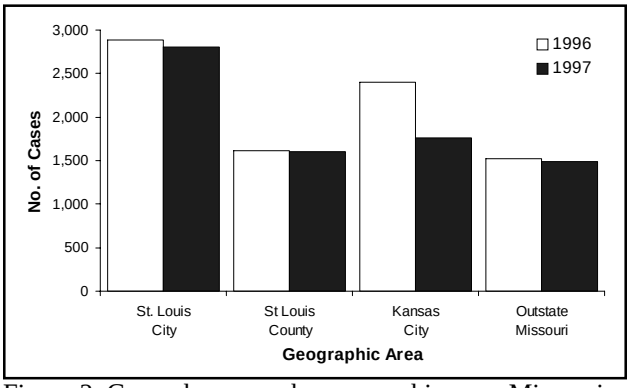


Figure 2. Gonorrhea cases by geographic area, Missouri, reported 1996 and 1997

Table 1. Reported Gonorrhea Cases by Gender, Race, Age Group and Geographic Area, Missouri, 1996 and 1997.

	REPORTED 1996	REPORTED 1997	PERCENT CHANGE
GENDER			
MALES	4,226	3,544	-16%
FEMALES	4,189	4,112	-2%
RACE			
WHITE	850	741	-13%
BLACK	6,265	5,423	-13%
ASIAN	9	9	0%
AMERICAN INDIAN	2	8	300%
OTHER/UNKNOWN	1,289	1,495	16%
AGE GROUP*			
<13	23	20	-13%
13–19	2,922	2,651	-9%
20–29	3,645	3,335	-9%
30–39	1,303	1,130	-13%
40–49	370	380	3%
>49	101	96	-5%
GEOGRAPHIC AREA			
ST. LOUIS CITY	2,885	2,806	-3%
ST, LOUIS COUNTY	1,614	1,603	-1%
KANSAS CITY	2,400	1,753	-27%
OUTSTATE	1,516	1,494	-1%
TOTAL	**8,415**	**7,656**	**-9%**

*Excludes unknown ages
Note: Data excludes gonococcal ophthalmia cases.

reported cases in 1997 was 149.6 cases per 100,000 population. St. Louis City, St. Louis County, Kansas City and Outstate Missouri each showed decreases in reported gonorrhea cases from 1996 to 1997 of 2.9 percent, 0.7 percent, 27 percent, and 2.5 percent, respectively. (See Figure 2.) In 1997, MIPP* screening efforts detected 18.4 percent (1,408 cases) of all reported gonorrhea cases statewide.

African Americans and younger persons continue to be disproportionately represented among reported gonorrhea cases. African Americans made up 5,423 (70.8%) of the 7,656 reported cases during 1997, with a corresponding rate of 989.2 cases per 100,000 population. Whites made up 741 reported cases (9.7%), for a rate of 16.5 cases per 100,000 population. Young people under 25 years of age made up 64.2 percent of total reported gonorrhea cases in 1997. Table 1 describes gonorrhea cases reported in 1996 and 1997 by gender, race, age group, and geographic area.

Gonorrhea was reported from 85 (74.6%) of the 114 Missouri counties during 1997, with the highest incidence, and the highest rates, occurring in the major urban areas. (See Figure 3.)

Gonococcal Pelvic Inflammatory Disease (GPID)

The most common consequence of untreated gonorrhea is gonococcal pelvic inflammatory disease (GPID), a serious infection of the female reproductive organs that can scar or damage cells lining the fallopian tubes, resulting in infertility in as many as ten percent of women affected. The tubal scarring associated with PID can also lead to ectopic pregnancy.

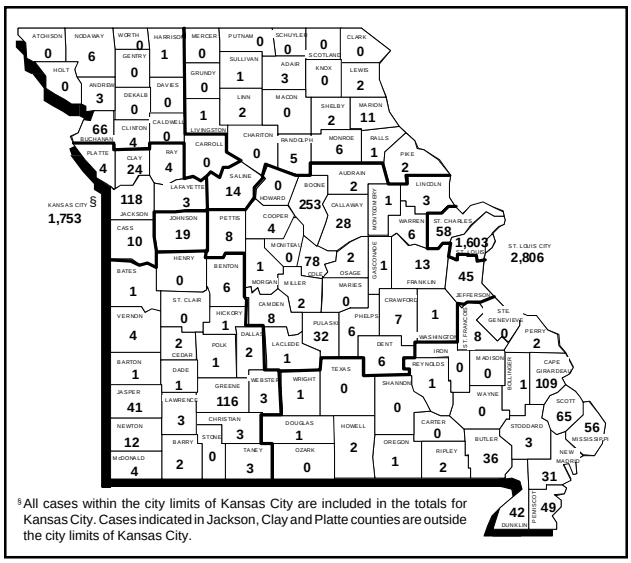


Figure 3. Reported gonorrhea cases by county, Missouri, 1997

In Missouri, reported cases of GPID increased 10 percent from 133 cases in 1995 to 146 cases in 1996, and then decreased 49 percent to 74 cases in 1997. However, it appears that cases of GPID are underreported and, consequently, the actual incidence of this condition is much higher than indicated by these numbers.

REFERENCES:

1. CDC. 1998 Guidelines for treatment of sexually transmitted diseases. MMWR 1998;47(No. RR-1). **http://www.cdc.gov/epo/mmwr/preview/ind98_rr.html**
2. National Institute of Allergy and Infectious Diseases. Fact Sheet: Gonorrhea, June 1998. **http://www.ama-assn.org/special/std/support/educate/stdclam.htm**

*The Missouri Infertility Prevention Project (MIPP) is a collaborative effort implemented in 1993 with STD and family planning clinics to prevent infertility in females due to sexually transmitted diseases.

Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS)

Human immunodeficiency virus (HIV) is a retrovirus which is transmitted from person-to-person through sexual contact, blood-to-blood contact (such as the sharing of HIV-contaminated needles and syringes by injecting drug users) and from an infected mother to her infant before or at the time of birth, or through breast-feeding.

Acquired immunodeficiency syndrome (AIDS) is a specific group of diseases and conditions indicative of severe immunosuppression related to HIV infection. The clinical manifestations of HIV infection, unlike those of most other reportable diseases, do not usually develop until years after the person becomes infected. The average time between infection with HIV and a diagnosis of AIDS has averaged approximately eight to ten years, but today is likely to be longer for many infected persons who are receiving newer, more effective treatment.

The severity of HIV-related illness is directly related to the degree of dysfunction of the immune system. The onset of clinical illness, often several years after initial infection, is usually insidious with non-specific signs and symptoms such as swollen lymph nodes, loss of appetite, diarrhea, weight loss, fever, fatigue and vaginal candidiasis (yeast infection). Over time, the immune system dysfunction associated with HIV infection worsens, making the individual increasingly vulnerable to certain serious opportunistic infections and malignancies.

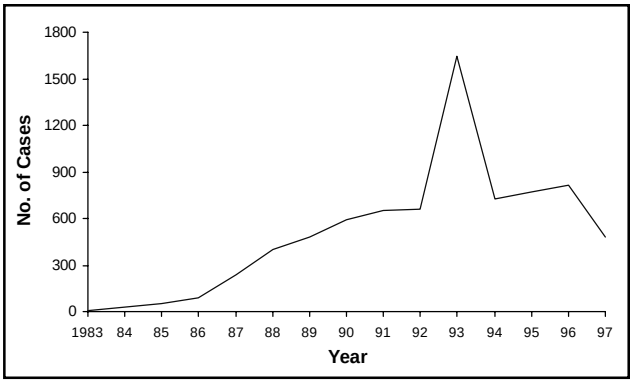


Figure 1. AIDS cases by year of report, Missouri, 1983–97

On January 1, 1993, the Centers for Disease Control and Prevention (CDC) expanded the AIDS case definition to include persons infected with HIV who have laboratory evidence of severely impaired immune function (e.g., CD4+ cell counts under 200 and/or a CD4+ percentage of <14%). Also, the new definition added pulmonary tuberculosis, recurrent pneumonia and invasive cervical cancer to the previous list of 23 AIDS-indicator diseases and conditions.*

Since the beginning of the HIV/AIDS epidemic, a total of 3,700 HIV cases and 7,434 AIDS cases have been reported in Missouri residents.** In 1996, 536 HIV cases and 816 AIDS cases were reported; in 1997, 470 HIV cases and 480 AIDS cases were reported. The 480 AIDS cases reported in 1997 represented a 41.2 percent decrease from the 816 AIDS cases reported in 1996. The primary reason for this decline appears to be the use of more effective treatment regimens for HIV infection. (See Figure 1.)

Males comprised 86.9 percent of AIDS cases, and 78.5 percent of HIV cases, reported in 1997. (See Table 1.)

*The 1993 expansion of the AIDS surveillance case definition had a significant impact on the number of AIDS cases reported in Missouri that year. Of the 1,644 AIDS cases reported in 1993, 1,024 (62.3%) were the direct result of the new case definition.

** Persons infected with HIV who do not meet the AIDS surveillance case definition are termed **HIV cases;** infected individuals who do meet the case definition are **AIDS cases**. An HIV-infected person reported to the Missouri Department of Health is classified as either an HIV case or an AIDS case. An HIV case who subsequently meets the AIDS case definition is reclassified as an AIDS case. This method of classification makes it possible to more accurately depict the epidemic and better describe the continuum of HIV disease in the state.

Table 1. Summary of Reported HIV Cases and AIDS Cases, Missouri, 1982–1997

	HIV Cases*				AIDS Cases**				HIV/AIDS Cases
	Reported 1997		Cumulative*		Reported 1997		Cumulative		Cumulative
	Case	%	Case	%	Case	%	Case	%	Case	%
Geographic Location										
Missouri	470	100.0%	3,700	(100.0%)	480	(100.0%)	7,434	(100.0%)	11,134	(100.0%)
St. Louis City†	137	(29.1%)	1,062	(28.7%)	120	(25.0%)	1,980	(26.6%)	3,042	(27.3%)
St. Louis County†	77	(16.4%)	526	(14.2%)	92	(19.2%)	1,197	(16.1%)	1,723	(15.5%)
Kansas City†	101	(21.5%)	965	(26.1%)	113	(23.5%)	2,153	(29.0%)	3,118	(28.0%
Outstate†	112	(23.8%)	913	(24.7%)	129	(26.9%)	1,934	(26.0%)	2,847	(25.6%)
Missouri Correctional Facilities††	43	(9.1%)	234	(6.3%)	26	(5.4%)	170	(2.3%)	404	(3.6%)
Gender										
Male	369	(78.5%)	3,130	(84.6%)	417	(86.9%)	6,832	(91.9%)	9,962	(89.5%)
Female	101	(21.5%)	570	(15.4%)	63	(13.1%)	602	(8.1%)	1,172	(10.5%)
Race/Ethnicity										
White	249	(53.0%)	1,984	(53.6%)	260	(54.2%)	5,098	(68.6%)	7,082	(63.6%)
Black	206	(43.8%)	1,595	(43.1%)	209	(43.5%)	2,146	(28.9%)	3,741	(33.6%)
Hispanic	10	(2.1%)	77	(2.1%)	10	(2.1%)	142	(1.9%)	219	(2.0%)
Asian/Pacific Islander	1	(0.2%)	12	(0.3%)	0	(0.0%)	17	(0.2%)	29	(0.3%)
American Indian	2	(0.4%)	10	(0.3%)	1	(0.2%)	30	(0.4%)	40	(0.4%)
Unknown	2	(0.4%)	22	(0.6%)	0	(0.0%)	1	(0.0%)	23	(0.2%)
Age at Diagnosis‡										
<13	2	(0.4%)	41	(1.1%)	2	(0.4%)	51			
13-19	27	(5.7%)	177	(4.8%)	7	(1.5%)	71			
20-29	167	(35.5%)	1,507	(40.7%)	97	(20.2%)	1,744			
30-39	165	(35.1%)	1,386	(37.5%)	222	(46.3%)	3,409			
40-49	81	(17.2%)	451	(12.2%)	112	(23.3%)	1,540			
>49	28	(6.0%)	138	(3.7%)	40	(8.3%)	619			
Exposure Category¶										
MSM	208	(44.3%)	2,165	(58.5%)	314	(65.4%)	5,358	(72.1%)	7,523	(67.6%)
MSM/IDU	14	(3.0%)	238	(6.4%)	19	(4.0%)	669	(9.0%)	907	(8.1%)
IDU	51	(10.9%)	366	(9.9%)	41	(8.5%)	509	(6.8%)	875	(7.9%)
Heterosexual Contact	55	(11.7%)	463	(12.5%)	56	(11.7%)	495	(6.7%)	958	(8.6%)
Adult Hemophiliac	1	(0.2%)	24	(0.6%)	5	(1.0%)	143	(1.9%)	167	(1.5%)
Adult Transfusion	2	(0.4%)	16	(0.4%)	2	(0.4%)	93	(1.3%)	109	(1.0%)
Other/Unknown Adult	137	(29.1%)	387	(10.5%)	41	(8.5%)	107	(1.4%)	494	(4.4%)
Perinatal Transmission	2	(0.4%)	34	(0.9%)	2	(0.4%)	41	(0.6%)	75	(0.7%)
Other/Unknown Pediatric	0	(0.0%)	7	(0.2%)	0	(0.0%)	19	(0.3%)	26	(0.2%)
Missouri Total	**470**	**100.0%)**	**3,700**	**(100.0%)**	**480**	**(100.0%)**	**7,434**	**(100.0%)**	**11,134**	**(100.0%)**

*HIV Cases-Persons infected with HIV who have not developed one of the specific diseases or conditions which would cause them to meet the case definition for AIDS.

**AIDS Cases-Persons infected with HIV who have developed one or more of the specific diseases or conditions which cause them to meet the AIDS case definition.

†Does not include persons living in correctional facilities at the time of diagnosis.

††Includes state, county and local correctional facilities.

‡For HIV Cases, Age at Diagnosis is the age at which the individual was first diagnosed with HIV infection.
For AIDS Cases, Age at Diagnosis is the age at which the individual was firs iagnosed with AIDS.

¶MSM=men who have sex with men; MSM/IDU=men who have sex with men and inj drugs; IDU=injecting drug users

African Americans, along with Hispanic males, are disproportionately represented in the HIV/AIDS epidemic in Missouri. In 1997, the rate of reported AIDS cases in African Americans was 6.6 times the rate in whites. The rate of reported AIDS cases in Hispanics in 1997 was 2.8 times the rate in whites. However, from 1982–1997, the total number of reported AIDS cases in Hispanics (142) was much lower than the 5,098 cases reported in whites and the 2,146 cases reported in African Americans. Of the 142 reported Hispanic cases, 135 (95.1%) were in males. Asians and American Indians each comprise less than 0.5 percent of HIV and AIDS cases in Missouri. (See Table 1.)

Of the total reported AIDS cases in 1997, 46.3 percent were diagnosed in 30–39 year olds, and 20.2 percent in 20–29 year olds. Of the total HIV cases reported in 1997, 35.5 percent were diagnosed in 20–29 year olds. These data indicate that many infections are occurring in persons in their early twenties, and that infections are also occurring in teenagers. (See Table 1.)

Of the 480 adult/adolescent AIDS cases reported in 1997: 314 (65.4%) were in men who have sex with men (MSM); 19 (4.0%) in men who have sex with men and inject drugs (MSM/IDUs); 41 (8.5%) in injecting drug users (IDUs); 56 (11.7%) in heterosexual contacts; and 41 (8.5%) are still being investigated and have not yet been placed in a specific exposure category. (See Table 1.)

Of the 470 adult/adolescent HIV cases reported in 1997: 208 (44.3%) were in MSM; 14 (3.0%) were in MSM/IDUs; 51 (10.9%) were in IDUs; and 55 (11.7%) were in heterosexual contacts. A relatively large number, 137 (29.1%), are still being investigated and have not yet been placed in a specific exposure category. (See Table 1.)

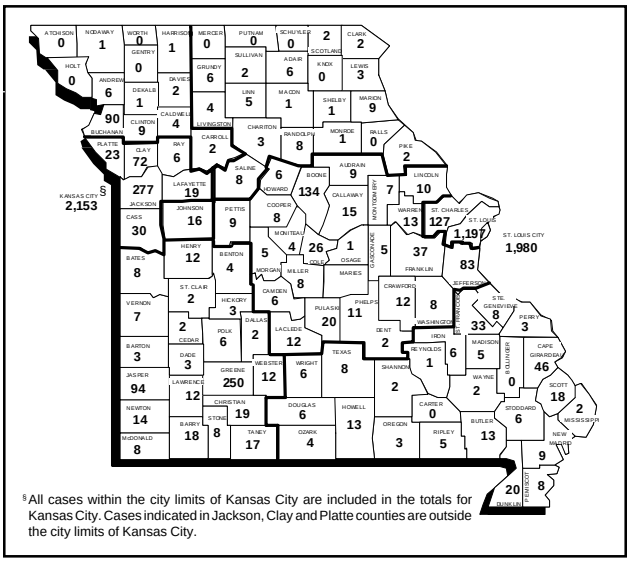


Figure 2. Cumulative reported AIDS cases by county of residence, Missouri, through December 31, 1997

The geographic distribution of AIDS cases in Missouri is shown in Figure 2. As of December 31, 1997, AIDS cases have been reported in residents of 103 (90.4%) of the state's 114 counties. Six (50%) of the 12 counties with no reported AIDS cases have residents who have been reported as infected with HIV, but who have not progressed to AIDS.

The majority of HIV cases and AIDS cases in Missouri in 1996 and 1997 were from the major metropolitan areas of St. Louis and Kansas City. (See Table 1.) Together, these two areas accounted for 69.3 percent of AIDS cases and 65.5 percent of HIV cases reported in 1996, and 67.7 percent of AIDS cases and 67.0 percent of HIV cases reported in 1997. (See Figure 3.)

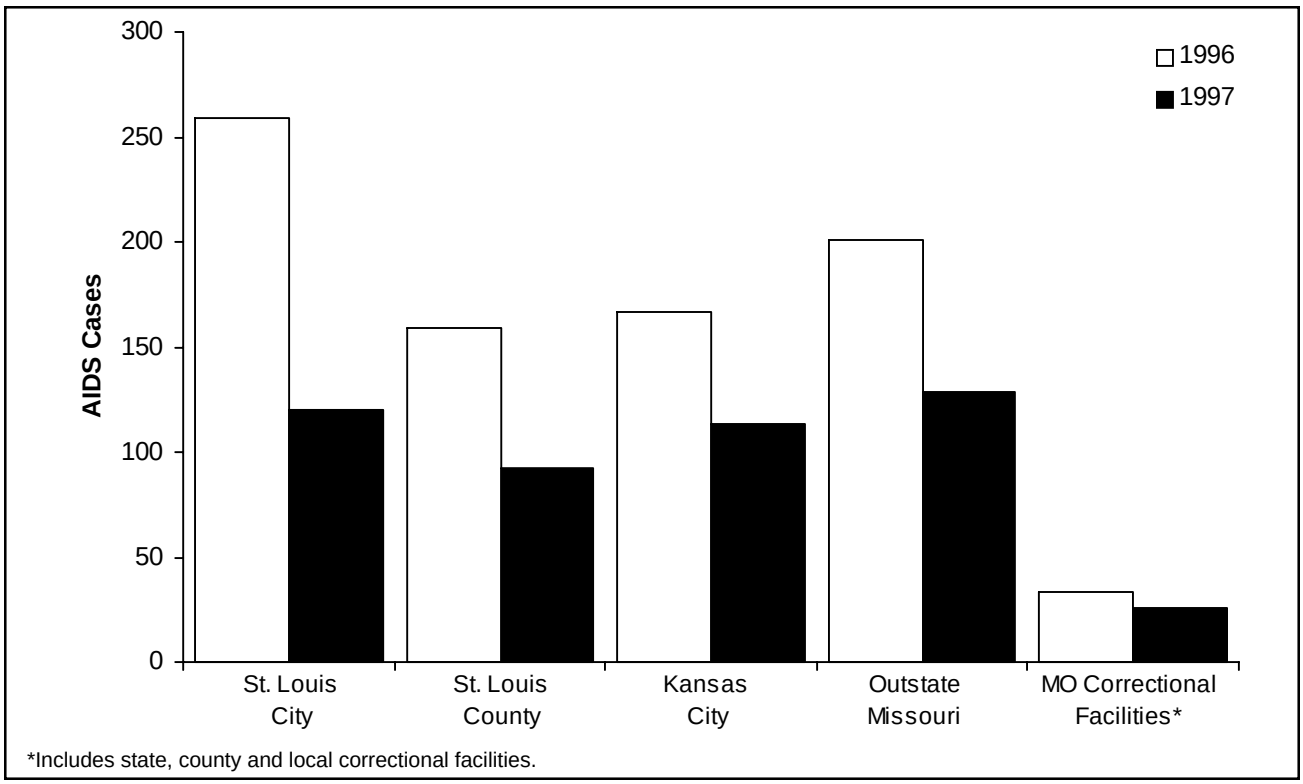


Figure 3. AIDS cases by geographic area, Missouri, reported 1996 and 1997

Syphilis (Primary, Secondary and Early Latent)

Syphilis is a sexually transmitted disease (STD) caused by a bacterium called *Treponema pallidum*. The initial infection causes an ulcer at the site of infection; however, the bacteria move throughout the body, damaging many organs over time. The course of the disease is divided into four stages:

- primary—characterized by an ulcer (chancre) at the site of infection
- secondary—characterized by a rash that often involves the palms and soles
- latent—no symptoms are present
- tertiary—may cause serious heart abnormalities, mental disorders, blindness, other neurologic (nervous system) problems, and death

Early syphilis includes primary, secondary and early latent (reported within less than one year from the time of infection) cases.

The bacterium generally spreads from the ulcer (chancre) of an infected person to the skin or mucous membranes of the genital area, the mouth, or the anus of a sexual partner. It also can pass through broken skin on other parts of the body. The infection is almost always spread by sexual contact. In addition, a pregnant woman with syphilis can pass the bacterium to her unborn child, who may then experience serious mental and physical problems as a result of this infection (congenital syphilis).

Syphilis is usually treated with penicillin, administered by injection. Other antibiotics can be used for patients allergic to penicillin. In all stages of syphilis, proper treatment will cure the disease, but in late syphilis, damage already done to body organs cannot be reversed. All sex partners of a person with syphilis must be evaluated and treated to prevent reinfection and further spread of the disease.[1,2]

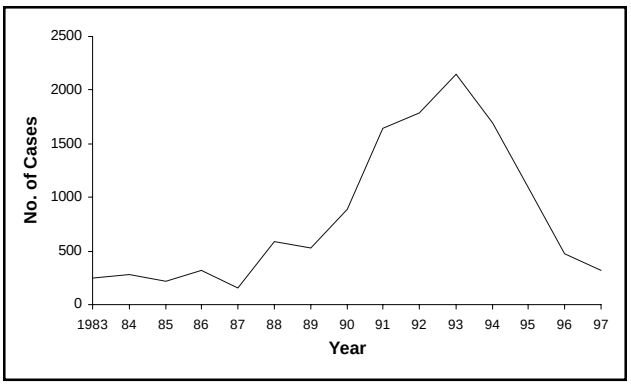


Figure 1. Early syphilis cases by year of report, Missouri, 1983–97

Table 1. Reported Primary and Secondary Syphilis Cases by Gender, Race, Age Group and Geographic Area, Missouri, 1996 and 1997.

	REPORTED 1996	REPORTED 1997	PERCENT CHANGE
GENDER			
MALES	118	55	-53%
FEMALES	103	63	-39%
RACE			
WHITE	13	14	8%
BLACK	204	102	-50%
ASIAN	2	0	-100%
AMERICAN INDIAN	0	0	0%
OTHER/UNKNOWN	2	2	0%
AGE GROUP*			
<13	0	0	0%
13–19	20	9	-55%
20–29	67	49	-27%
30–39	82	37	-55%
40–49	39	16	-59%
>49	13	7	-46%
GEOGRAPHIC AREA			
ST. LOUIS CITY	142	64	-55%
ST, LOUIS COUNTY	53	29	-45%
KANSAS CITY	7	2	-71%
OUTSTATE	19	23	21%
TOTAL	**221**	**118**	**-47%**

In Missouri, the reported incidence of early syphilis decreased by 56.0 percent from 1,090 cases in 1995 to 480 cases in 1996, and then further decreased by 33.4 percent to 320 cases in 1997. (See Figure 1.)

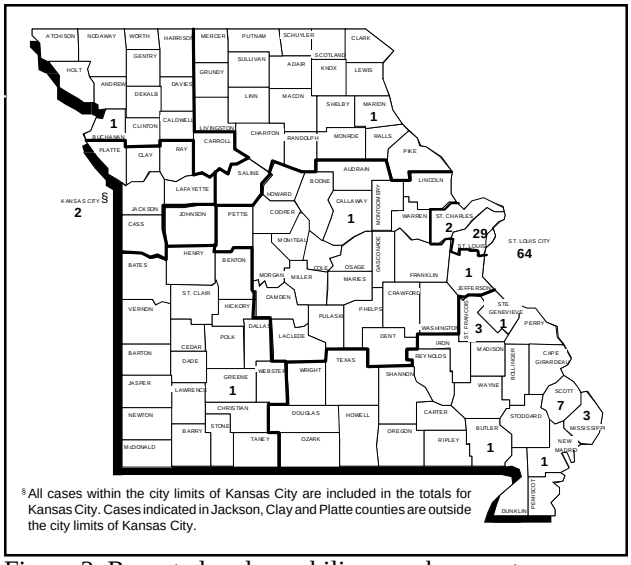
Primary and secondary (P&S) syphilis cases in Missouri decreased 46.6 percent, from 221 cases in 1996 to 118 cases in 1997. Missouri's 1997 P&S syphilis rate of 2.3 cases per 100,000 population was lower than the national rate of 3.2.

Of the 118 P&S syphilis cases reported in 1997, 46.6 percent were in males and 53.4 percent were in females.

African Americans are disproportionately represented among reported P&S syphilis cases. In 1997, 102 (86.4%) cases in African Americans were reported, compared to 14 (11.9%) cases in whites. The rate of reported cases in African Americans (18.6 cases per 100,000 population) was 62 times the rate in whites (0.3 cases per 100,000 population). (See Table 1.)

The St. Louis metropolitan area reported the majority of early syphilis cases during 1996 and 1997. In 1996, St. Louis City reported 142 (64.2%) of the state's 221 cases of P&S syphilis, and 136 (52.5%) of the 259 total cases of early latent syphilis. In 1997, St. Louis City reported 64 (54.2%) of the state's 118 cases of P&S syphilis, and 147 (72.7%) of the 202 total cases of early latent syphilis. (See Figure 2.)

In 1997, St. Louis City ranked 9th among all cities in the United States of greater than 200,000 population with a P&S syphilis rate of 17.1 cases per 100,000 population. Kansas City, with a rate of 0.4, ranked 54th. (In 1997, the national P&S syphilis rate for cities of greater than 200,000 population was 6.1.)



§ All cases within the city limits of Kansas City are included in the totals for Kansas City. Cases indicated in Jackson, Clay and Platte counties are outside the city limits of Kansas City.

Figure 2. Reported early syphilis cases by county, Missouri, 1997

REFERENCES:

1. National Institute of Allergy and Infectious Diseases. Fact Sheet: Syphilis, July 1998. **http://www.ama-assn.org/special/std/support/educate/stdsyph.htm**
2. CDC Division of STD Prevention. Syphilis Facts. **http://www.cdc.gov/nchstp/dstd/Syphilis_Facts.htm**

Congenital Syphilis

Congenital syphilis results from transmission of *Treponema pallidum* (the syphilis bacterium) from an infected mother to her infant before or at the time of birth. A baby born to a mother with either untreated or inadequately treated syphilis may have a 40–70 percent chance of being infected and developing congenital syphilis. (In addition, an infected pregnant woman has about a 40 percent chance of having a stillbirth [syphilitic stillbirth] or delivering a baby who dies shortly after birth.)

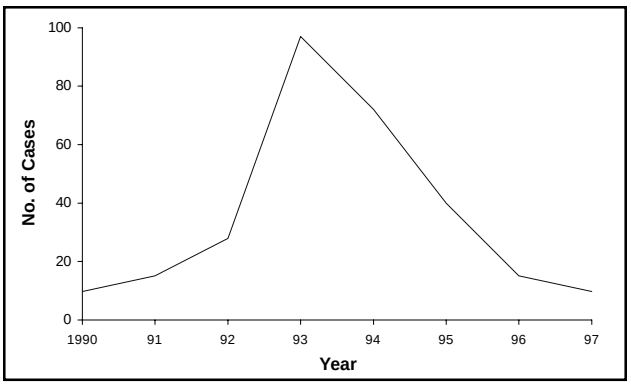


Figure 1. Congenital syphilis cases by year of report, Missouri, 1990–97

Some infants with congenital syphilis may have symptoms at birth, but most develop symptoms between two weeks and three months later. These symptoms may include skin sores, rashes, fever, weakened or hoarse crying sounds, swollen liver and spleen, yellowish skin (jaundice), anemia, and various deformities. Care must be taken in handling an infant with congenital syphilis because the moist sores are infectious.

Rarely, the symptoms of syphilis go undetected in infants. As infected infants become older children and teenagers, they may develop the symptoms of late-stage syphilis including damage to their bones, teeth, eyes, ears, and brain.

An infant born to a mother with untreated or inadequately treated syphilis will be evaluated for symptoms of congenital syphilis, and blood tests for syphilis as well as other tests will normally be performed. Treatment of infected infants is with penicillin.[1,2]

In recent years, the annual number of reported* congenital syphilis cases in Missouri has declined sharply, from 97 cases reported in 1993 to 12 cases reported in both 1996 and 1997. (See Figure 1.)

In Missouri, congenital syphilis cases have primarily been concentrated in the St. Louis metropolitan area. In 1996, St. Louis City reported the largest number of congenital syphilis cases (7 cases, or 58.3% of the 12 total Missouri cases), followed by St. Louis County (4 cases, or 33.3% of the state's total); a single case was reported from Outstate Missouri (8.3% of total reported cases). In 1997, St. Louis County reported 6 (50%) of Missouri's 12 congenital cases, followed by St. Louis City with 4 cases (33.3%). Both Outstate Missouri and Kansas City reported one case (8.3% of the state's total) each.

African American infants are disproportionately represented among congenital syphilis cases, comprising 10 (83.3%) of the 12 congenital cases

*__Reporting of Congenital Syphilis Cases__—In 1989, a new surveillance case definition for congenital syphilis was introduced. The new case definition has greater sensitivity than the former definition. In addition, many areas greatly enhanced active case finding for congenital syphilis during this time. For these reasons, the number of reported cases increased dramatically during 1989–1991. As is true of any change, a period of transition during which trends cannot be clearly interpreted has resulted; however, all reporting areas had implemented the new case definition for reporting all cases of congenital syphilis after January 1, 1992. Therefore, the reliability of trends is expected to have stabilized after this date.

In addition to changing the case definition, the Centers for Disease Control and Prevention (CDC) introduced a new data collection form (CDC 73.126) in 1990. This form collects individual case information and allows more thorough analysis of cases. By 1992, most areas had implemented this form. Race and ethnicity rates for congenital syphilis have been calculated for 1992–1994 using these data. For the purposes of these analyses if either race or ethnicity question was answered, the case was included. For example, if "White" race was marked, but ethnicity was left blank, the individual was counted as "non-Hispanic White."

reported in 1996, and 9 (75.0%) of the 12 cases reported in 1997.

Of the 12 congenital syphilis cases reported in 1997, 10 (83.3%) were born to single mothers. In addition, 7 (58.3%) of the 12 infants were born to mothers receiving no prenatal care.

Two factors that are vital to the prevention of congenital syphilis cases are: 1) reducing the overall occurrence of syphilis in the community, and 2) routine syphilis screening of pregnant women in prenatal care. Access to prenatal care and/or the willingness of pregnant women to seek prenatal care are thus significant factors in the prevention of cases of congenital syphilis. Pregnant females and newborns with positive syphilis tests are high priority for field investigation by public health personnel. Intensive interaction with the patient is provided to assure proper diagnosis and treatment, the performance of appropriate behavioral risk assessment, and the education of the mother on the importance of prenatal care and repeat syphilis testing.

An additional factor which appears related to the occurrence of congenital syphilis is the use of illicit drugs, especially crack cocaine. Crack use has been associated with high risk sexual behaviors, and with the acquisition of syphilis. It has also been associated with lack of prenatal care among pregnant female users. While precise data on the relationship between illicit drug use and syphilis infection in Missouri are not available, there is substantial anecdotal evidence obtained by public health investigators which indicates that drugs, and especially crack cocaine, do play a significant role in promoting the spread of the disease in the state.

REFERENCES:

1. National Institute of Allergy and Infectious Diseases. Fact Sheet: Syphilis, July 1998. **http://www.ama-assn.org/special/std/support/educate/stdsyph.htm**
2. CDC Division of STD Prevention. Syphilis Facts. **http://www.cdc.gov/nchstp/dstd/Syphilis_Facts.htm**

Tuberculosis

Tuberculosis (TB) (*Mycobacterium tuberculosis*)

Tuberculosis is a bacterial disease whose symptoms can often be mistaken for those of other respiratory illnesses. It is transmitted by airborne droplet nuclei that are produced when a person with infectious tuberculosis coughs or sneezes the organism into the air. If another person inhales air containing viable droplet nuclei, then transmission may happen. The lungs are most commonly involved; however, approximately 20 percent of the cases are extrapulmonary. Extrapulmonary tuberculosis may occur in any tissue or organ of the body, including the brain, kidneys, eyes, bones, joints, and lymphatic system. Individuals with prolonged exposure or who are close contacts to an active case of tuberculosis are at greater risk of becoming infected. About five to ten percent of those infected will develop active disease at some time during their lifetime. Individuals who are HIV positive and hence infected with tuberculosis are at a much higher risk, seven to ten percent per year, of developing active tuberculosis disease.

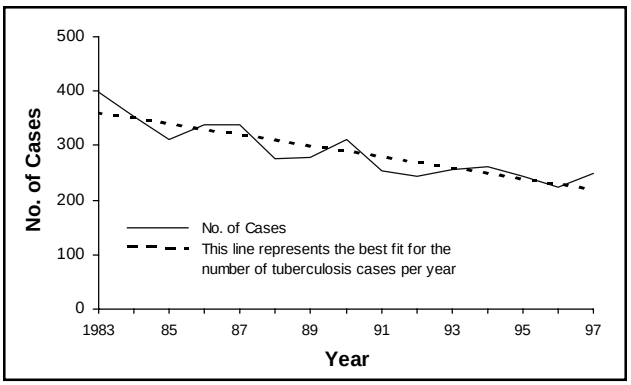


Figure 1. Tuberculosis cases by year of report, Missouri, 1983-97

In Missouri, there were 248 cases of tuberculosis reported in 1997 for a case rate of 4.7 per 100,000 population. This represents an 11 percent increase over 1996 when Missouri's tuberculosis cases reached an all time low with 224 cases reported. The case rate for 1996 was 4.2 per 100,000. This represents an 8 percent decrease from 1995. Although there have been fluctuations from year to year, the number of TB cases has been gradually declining since 1982. Figure 1 shows tuberculosis cases by year of report for the past 15 years and

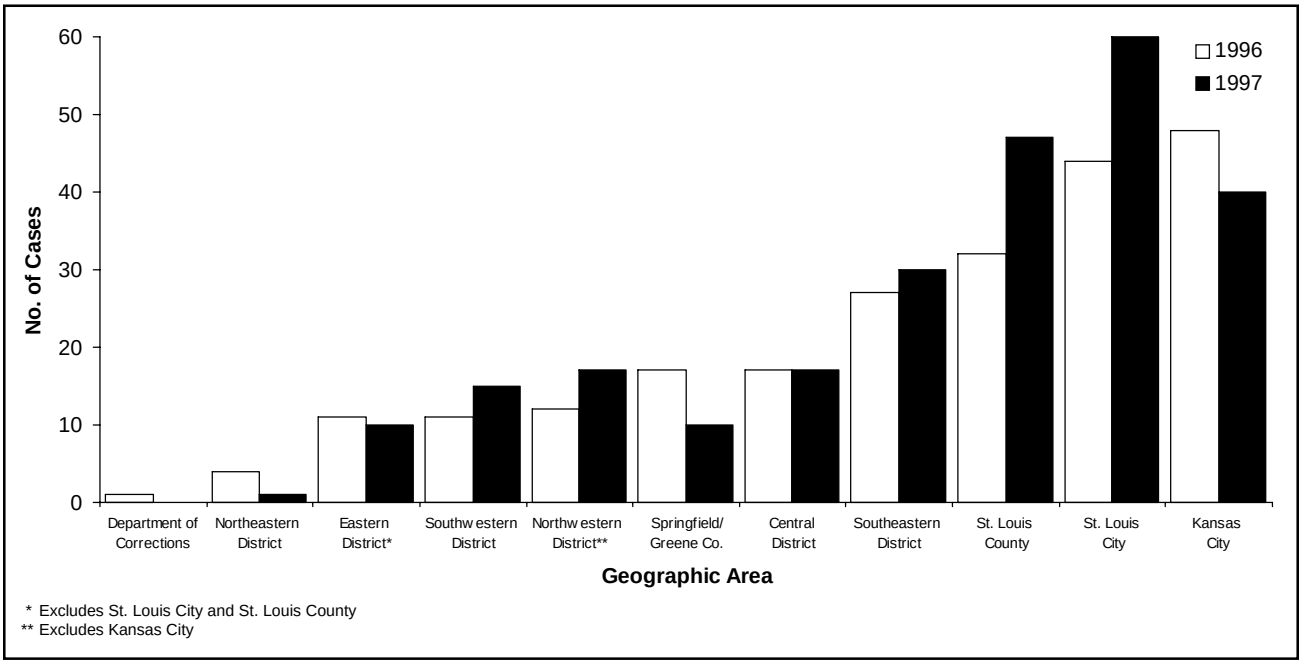


Figure 2. Tuberculosis cases by geographic area, Missouri, 1996 and 1997

includes a trend line representing the best fit for number of cases per year.

The number of reported cases in Missouri in 1996 and 1997 varied by geographical area, with the majority of cases reported from the large urban centers in the state, St. Louis City, St. Louis County, Kansas City, and Springfield/Greene County. This represents an increasing trend where the majority of cases are reported in the metropolitan areas. In 1996, 58 percent (n=141) of the cases were in the metropolitan areas, and in 1997, 64 percent (n=156). St. Louis City has experienced the biggest increase in their TB rate, increasing from 11 cases per 100,000 in 1995 (n=40) to 17 per 100,000 in 1997 (n=60). Although the reason behind the escalating numbers of TB cases is unknown at this point, several factors may be contributing to this increase, including low socioeconomic status, crowded living conditions, poor access to health care, TB/HIV infection, and difficulties in identifying and treating infected contacts. (See Figures 2 and 3.)

At the district level, the Southeastern District, which includes the Bootheel area, continues to have the highest number of TB cases of all outstate areas. The southernmost counties also tend to show the highest rates of TB. (See Figure 4.) Both Arkansas and Tennessee have higher rates of TB than Missouri, and likely impact our rates in southern Missouri. The Department of Corrections reported only one case in 1996 and no cases in 1997, evidence of their outstanding TB screening and control program for all inmates and employees. (See Figure 2.)

As expected, pulmonary cases accounted for the majority of cases reported. In 1996, 41 cases (18%) and in 1997, 48 cases (19%) were extrapulmonary. The predominant sites of extrapulmonary disease are the pleura, lymph system, and bone/joint.

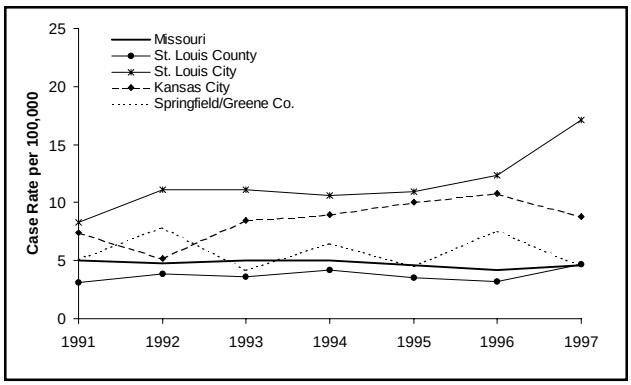


Figure 3. Tuberculosis case rates by metropolitan area, Missouri, 1991–97

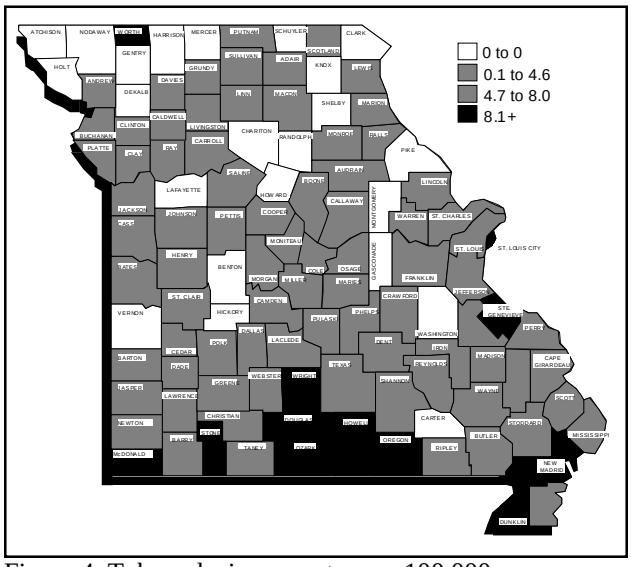


Figure 4. Tuberculosis case rates per 100,000 person-years by county, Missouri, 1993–97

Both 1996 and 1997 TB numbers remained consistent with the general trend of greater numbers of TB cases in males. In 1996, 145 (65%) were male and 79 (35%) were female. In 1997, 152 (61%) were male, and 96 (39%) were female.

There continues to be a disproportionately higher rate of TB among Missouri's minorities. In 1996, African Americans accounted for 70 (31%) of the cases, Asian/Pacific Islanders 30 (13%), Hispanics 8 (3.6%) and whites 116 (52%). There were no cases reported in Native Americans. When comparing case rates per 100,000 population,

whites continue to have the lowest rate (2.5), while Asian/Pacific Islanders have the highest rate (62.1).

In 1997, African Americans accounted for 97 (39%) of the cases, Asian/Pacific Islanders 27 (11%), Hispanics 16 (6.5%), Native Americans 1 (0.4%) and whites 123 (50%). While there was a modest decline in the rate in Asian/Pacific Islanders (50.7), rates in African Americans and Hispanics increased. (See Figure 5.) In African Americans, rates nearly doubled in St. Louis City from 21.6 per 100,000 in 1996 to 40.8 in 1997.

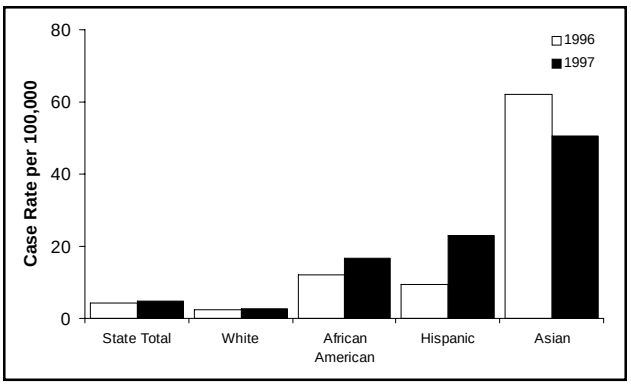


Figure 5. Tuberculosis case rates per 100,000 population by race and ethnicity, Missouri, 1996 and 1997

The number of foreign-born cases has also been steadily increasing, and reached an all time high in 1997. Foreign-born cases represented 19 percent of cases (n=42) in 1996 and 21 percent of cases in 1997 (n=51). Asian/Pacific Islanders made up the majority of the foreign-born cases. Of note is the uncommon age distribution of foreign-born cases. Most cases (37%) happen among the 25–44 year age group, rather than the 65–84 year age group seen in US-born cases. TB in younger adults is particularly significant in that it increases the likelihood of transmission to young children, as this age group coincides with the childbearing years. (See Figure 6.) Results of data from 1993–1997 indicated that foreign-born Asians arriving in the United States within the last five years in the 15–34 year and 55–74 year age groups had the highest rates of disease (45 and 87/100,000 person years, respectively). After noting that recent arrival to the United States from TB-endemic countries is a significant risk factor for the development of TB in foreign-born individuals, the Missouri Advisory Committee for the Elimination of TB (MACET) has recommended that these individuals be considered high priority for TB screening and TB infection treatment regardless of age.

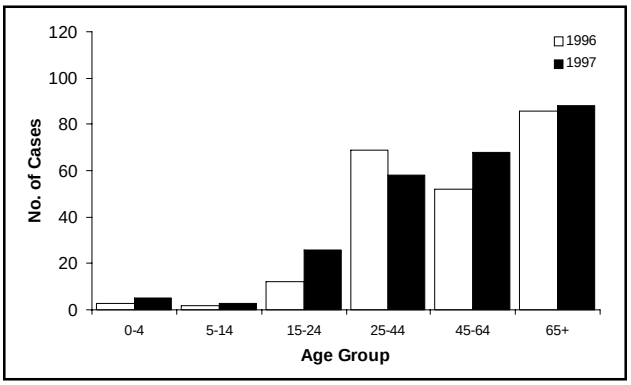


Figure 6. Tuberculosis cases by age group, Missouri, 1996 and 1997

Overall, the elderly continue to comprise the largest proportion of tuberculosis cases in Missouri. In 1996, 38.4 percent of the total TB cases were in the 65 and older age group (n=86), and 35.5 percent of the total (n=89) in 1997. (See Figure 6.) The number of cases in the elderly has statistically remained steady since 1993, ranging between 85 and 110 cases per year. Nursing homes continue to be targeted for prevention and case finding activities, since TB nationwide is twice as high for nursing home residents as for elderly not in nursing homes. In 1996, 9 cases were identified in nursing homes, and in 1997, that number increased to 12. Because nursing homes are a congregate setting of potentially immunosuppressed patients, MACET recommended that nursing-home employees (as well as all health care workers) with positive skin tests be considered for TB infection treatment regardless of age.

Pediatric TB is one measure of the effectiveness of a TB control program, as generally pediatric TB results from an unidentified or uncontrolled source

case in the home. Missouri's number of pediatric TB cases has remained low, with less than 10 cases per year since 1995. In 1996 there were 5 cases, and in 1997 there were 7 cases. Three out of the 7 cases in 1997 were foreign-born from highly endemic countries, and, therefore, had other risk factors for the development of TB. Although Missouri no longer recommends TB screening for all children, the American Academy of Pediatrics recommends that children with risk factors for TB should receive TB screening with a Mantoux skin test, particularly those born in endemic countries.

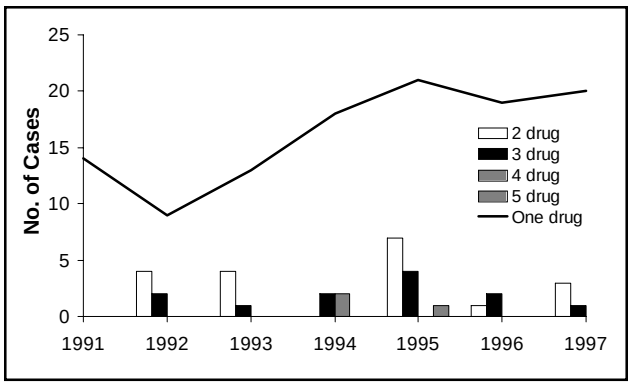


Figure 7. Number of drug and multidrug resistant tuberculosis cases, Missouri, 1991–97

The number of multidrug-resistant cases of TB is another possible barometer of TB control effectiveness. Less than 5 cases of multidrug resistance were reported per year for both 1996 (n=3) and 1997 (n=4). Of these, only one case acquired multi-drug resistance in 1996. The remaining 6 were infected with a multidrug-resistant strain. However, single-drug resistance still remains elevated. In 1996, 8.5 percent (n=19) of cases were single-drug resistant, and in 1997, it declined slightly to 8.0 percent (n=20). In 1997, most of the single-drug resistance was to Isoniazid (7%). (See Figure 7.) The American Thoracic Society and the Centers for Disease Control and Prevention Guidelines recommend that all suspect TB patients begin a four-drug regimen (isoniazid, rifampin, pyrazinamide, and ethambutol) when the isoniazid resistance rate is over four percent. Since the isoniazid-resistant cases were from both outstate and metropolitan areas, Missouri has made the four-drug regimen a statewide recommendation. This recommendation is gradually gaining acceptance, with 65 percent of patients starting a four-drug regimen in 1996, and 75 percent in 1997.

The number of TB/HIV cases dropped in Missouri from 20 in 1996 to 10 in 1997. Both years, the majority of cases were reported from the metropolitan areas, 88 percent in 1996, and 90 percent in 1997. No cases were reported by the Department of Corrections. Physicians at these metropolitan clinics report that HIV positivity is newly diagnosed at the time of TB disease diagnosis. Generally, in Missouri's dually infected cases, HIV diagnosis is found after the TB diagnosis is made. The Centers for Disease Control and Prevention recommend HIV testing for all TB disease patients. However, most TB cases in Missouri are either not offered HIV testing, or it is reported as unknown (66% in 1996, and 54% in 1997).

TB Prevention

In Missouri, TB prevention activities have gained more focus as TB rates drop. The state TB program conducts a preventable case analysis on all reported TB cases each year, and maintains a TB infection registry. These two activities help target strategies for TB disease prevention.

A set protocol for preventable case analysis was implemented for all cases in 1997. Analyses indicate that 30 percent (n=68) of the cases were potentially preventable. These cases had risk factors for TB and were candidates for infection treatment prior to disease onset, but were not treated. Of these 68, 12 percent (n=8) had known positive skin tests, 34 percent (n=23) were known contacts to TB cases, 38 percent (n=26) immigrated from TB-endemic countries, and 26 percent (n=18)

had medical conditions predisposing to TB (e.g. HIV) but unknown PPD status. (Note: 7 of the 68 had two risk factors and were counted twice).

TB infection has been a reportable condition in Missouri since 1991. The TB control program uses this information to ensure appropriate treatment of TB-infected patients, and identify areas with possibly disproportionate numbers of TB infection. The TB infection registry had 4,619 reports of TB infection in 1996, and 6,205 reports in 1997. This increase is believed to be due to an increase in reporting, rather than a true increase in TB incidence. This registry is also used to track completion of infection treatment. Based on a study of patients on TB infection treatment, it is estimated that between a third and a fourth of patients will not complete treatment due to noncompliance. The group studied excluded those patients that died, were incarcerated or declined due to adverse reactions. For TB infection patients who are high risk for developing TB, or work in a setting that is high risk for the spread of TB, the Missouri Department of Health recommends directly observed infection treatment to assist the patient in completing therapy.

Summary

The Missouri Department of Health's TB Control Program strategic plan focuses on high risk populations identified in this report including foreign-born persons from endemic areas, residents of St. Louis City and Kansas City, case contacts, the elderly, HIV-infected patients, and inmates. Promoting directly observed therapy and initiating four drug therapy on all active TB patients are the main strategies for reducing development and spread of drug resistant disease. Please feel free to contact TB control staff at the Department of Health with any comments or questions regarding this report at (800) 611-2912.

Zoonotic Diseases

Animal Bites

One-half to one million animal bites occur in the United States each year. Dogs account for over 75 percent of the bites and cats for 15 percent, while wild carnivores and humans account for the remaining ten percent. One percent of all emergency room visits are due to animal bites. Classified as the most serious of pet-associated health hazards, based on frequency, severity and financial expenditures, animal bites are estimated to be at least 50 percent under- reported.

Children are at the highest risk, with an age adjusted attack rate for the 5–14 year age group of one percent per year. Others at high risk are occupational groups such as meter readers, animal control officers and delivery personnel. Approximately ten percent of all animal bites require suturing and one to two percent require hospitalization. The fatality rate for animal bites is not known, but it is estimated that there are about ten fatalities per year. Larger dog breeds are responsible for more severe bites. Owned dogs protecting their territory are more likely to bite than strays. Medical costs in the United States average about $75.00 per incident, and the total cost is estimated to be from $38–75 million per year.

The most common infection associated with bites is *Pasteurella multocida*, especially from cat bites. Other organisms involved are *Staphylococcus aureus*, aerobic streptococci and anaerobes such as *Peptococcus spp.*, *Bacteroides spp.* and *Fusobacterium spp.* Other specific organisms can be involved with wild animal and rodent bites.

Animal bites are no longer reportable to the Department of Health effective April 30, 1996. However, since Missouri is an endemic area for rabies, it is of utmost importance that all animal bites are reported to the local health departments and medical evaluation of the biting incident is accomplished. Based on this evaluation, rabies post- exposure treatment may be indicated. Failure by the public to report or seek medical attention after a bite altercation could result in human cases of rabies.

The sheer number of bite altercations poses a serious public health threat to the Missouri general public. The cause of this high incidence of bite morbidity is multi-factorial. Appropriate pet selection, an understanding of the human-animal bond, responsible pet ownership, control of pet overpopulation, control of stray animals, and euthanasia programs are issues which need to be addressed through public health educational programs and local ordinances by local health departments with assistance from the Missouri Department of Health. Without this intervention, this complex problem with the potential for spread of zoonotic diseases to the human population will continue.

Arthropod-borne Viral Encephalitides

Encephalitis is an acute inflammatory process of the brain, spinal cord and meninges and is normally of short duration. Signs and symptoms include fever, severe headaches, stupor, disorientation, coma, spasticity, tremors and convulsions. Treatment is supportive in nature and post-disease sequelae may occur.

There are four arthropod-borne viral encephalitides of importance in the United States: Eastern equine (EEE), Western equine (WEE), St. Louis (SLE) and LaCrosse (LAC). All four are vectored by specific mosquitoes or group of mosquitoes between birds, equines and humans. Man is a dead end host, since transmission does not occur from humans to other humans or animals. Fatalities are highest with Eastern equine encephalitis.

All of these except EEE have occurred in Missouri. Incidence has been low during the past decade in Missouri and the United States. However, since sporadic cases continue to occur, it is evident that the virus is present in nature. A wetter environment may result in more mosquitoes, and with virus amplification over a period of time, outbreaks of disease may occur. Outbreaks have occurred two to four years after major floods. The 1993 and 1995 flooding in Missouri may have increased the risk of mosquito-borne diseases for four to six years.

Methods of prevention involve a system of surveillance in the normal hosts of birds and horses, and mosquito control to prevent spread and transmission to man. Prior to 1993, Missouri did not have its own system of surveillance in birds. It relied on surveillance systems in Illinois, Ohio and other neighboring states. Passive surveillance was conducted for equine and human cases of disease.

Due to the great flood of 1993, active surveillance was conducted in humans, horses and mosquitoes in Missouri in the summer of 1993. The Department of Health continued surveillance programs for SLE, WEE and LAC encephalitis during the 1994 and 1995 mosquito season. The following surveillance systems were operational:

- Active surveillance for
  - -human cases of disease
  - -equine cases of disease
  - -virus activity in mosquitoes
  - -virus activity in wild birds
- Monitoring of sentinel chicken flocks for virus activity

In 1994 and 1995, there were no human or equine arboviral cases reported in Missouri. Illinois had two human cases of SLE in 1995. No IgM antibodies specific for SLE or WEE were detected in chickens in Missouri. This indicated that arboviral activity was not occurring in those areas where the sentinel flocks were located in 1994 or 1995. Sera from three wild birds in Marion county tested positive for SLE during the last week in September 1995. No arboviral activity was detected in wild birds in 1994. All mosquito pools tested were negative, indicating that arboviral activity was not occurring or could not be detected in mosquitoes in Missouri in 1994 or 1995.

In 1996 and 1997, arboviral surveillance was reduced from the level of previous years due to budget constraints. The monitoring of five chicken flocks for the entire state was not considered to be productive or cost efficient, thus that part of the program was ended. Adult mosquito surveillance was reduced to the Mississippi River flood plain and in population dense areas. Thus, the arboviral surveillance programs for those years consisted of active surveillance for human cases of disease, for equine cases of disease, the search for virus activity in the wild bird populations in selected areas, and limited surveillance for virus activity in mosquitoes

in the St. Louis and Cape Girardeau areas. The mosquito collection programs in these areas were locally funded. Analysis of mosquitoes for virus was funded by the state. This limited surveillance program provided the structure for rapid implementation of a more comprehensive surveillance program, should virus activity be detected. Although a number of false alarms were encountered in 1996 and 1997, arboviral activity was not detected in Missouri. Illinois did detect activity in both wild bird and human populations in 1996 and 1997.

Borreliosis (Lyme Disease)

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, was found to be transmitted by the *Ixodes scapularis* tick (formerly known as *Ixodes dammini*). Subsequently, Lyme disease has been found in other areas of the United States including the west coast, where it is transmitted by *Ixodes pacificus*. The illness often begins within 30 days of a tick bite with a characteristic skin lesion called erythema migrans (EM) which may be accompanied by generally mild systemic symptoms. Late arthritic, cardiac or neurologic manifestations may develop weeks after the initial tick bite. The occurrence of Lyme disease in Missouri has been an enigma because the characteristic vector rarely bites humans in Missouri and the spirochete has been found only in rabbit ticks, *Ixodes dentatus*, which rarely bite humans. There have been numerous discoveries of spirochetes reacting with antibody tests in *Amblyomma* and *Dermacentor* ticks in Missouri, but all efforts to date to culture the bacteria from these ticks have failed.

The number of reported Lyme disease cases increased dramatically after it was designated a reportable disease in Missouri in June 1989, but reporting has declined since 1991. (See Figure 1.) There were 53 cases reported in 1996 and 27 cases reported in 1997, which met the case criteria set by the Centers for Disease Control and Prevention and the Council of State and Territorial Epidemiologists.

Figure 2 shows the number of cases by county in 1997. No deaths have ever been attributed to Lyme Disease. Cases appear to be associated with adults in rural areas.

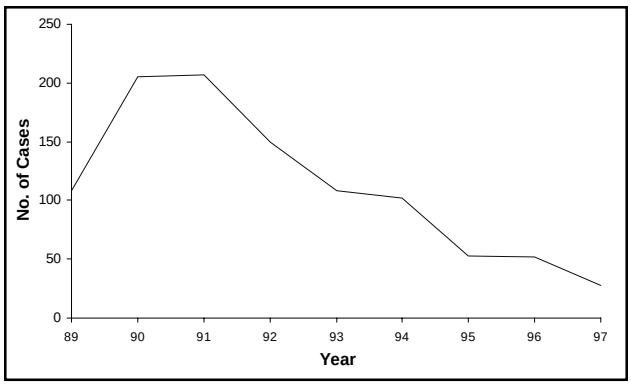


Figure 1. Lyme disease cases by year of report, Missouri, 1989–97

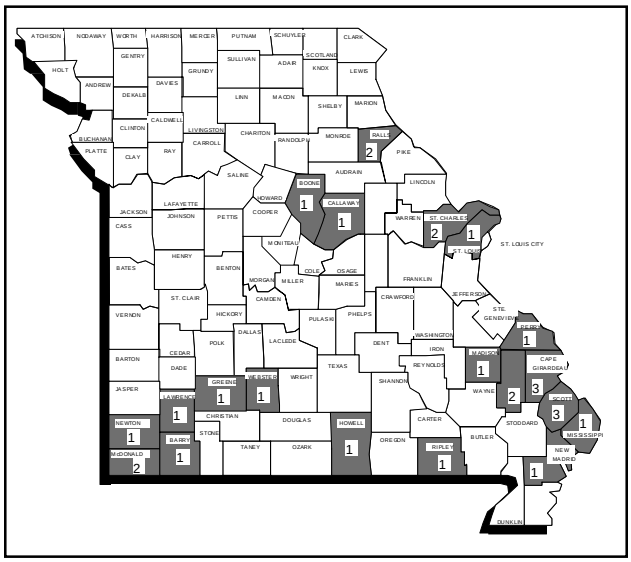


Figure 2. Lyme disease cases by county, Missouri, 1997

Brucellosis

Brucellosis is a bacterial disease of humans, cattle, swine and dogs in the United States. In humans, the disease is characterized by an acute or insidious onset of intermittent fever, headache, malaise, weakness, arthralgia and generalized influenza-like symptoms that persist for an extended period of time.

Historically, the disease was passed to humans from cattle via unpasteurized milk. With the advent of pasteurization of milk and the control and eradication of the disease in cattle, human brucellosis from cattle, with the exception of occupational exposure, has become a rarity. Canine brucellosis, however, is emerging as a new zoonotic disease challenge. The dog breeding industry is initiating its own voluntary control and prevention programs. Since dogs have intimate social contact with humans, transmission of this organism to humans may increase.

In 1996 and 1997, Missouri had 4 reported cases of human brucellosis. (See Figure 1.) The State Public Health Laboratory discontinued serologic testing for brucellosis as of June 30, 1988. Commercial laboratories use a variety of tests which make diagnosis in humans difficult and may contribute to the low level of reporting.

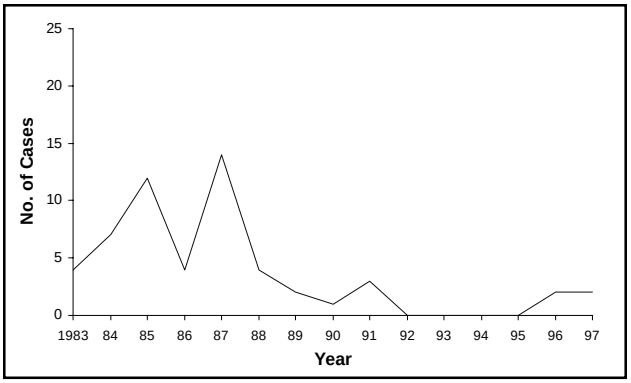


Figure 1. Brucellosis cases by year of report, Missouri, 1983–97

Ehrlichiosis

Ehrlichiosis is an acute febrile illness of humans, dogs, and horses. As with other tick-borne diseases, it has an acute onset with influenza-like symptoms including headache, myalgia, anorexia, nausea and, in some instances, a rash. Clinical laboratory abnormalities include leukopenia, thrombocytopenia and elevated levels of hepatic aminotransferase.

In humans, ehrlichiosis is caused by the organism *Ehrlichia chaffeensis*, a rickettsial species. *Ehrlichia*, members of the family Rickettsiaceae, are obligate, intracellular bacteria that parasitize mononuclear or polymorphonuclear leukocytes. The ability of *Ehrlichia* to infect and cause disease in animals is well documented. Previously, human cases (caused by *Ehrlichia canis* or a closely related organism) had been diagnosed in Japan and Malaysia. *E. canis* is a well-established cause of animal disease. The causative agent of human ehrlichiosis in the United States was isolated from a patient at Fort Chaffee, Arkansas in 1991. The organism is possibly transmitted by *Amblyomma americanum* (the Lone Star tick), *Dermacenter variabilis* (the wood tick) or *Rhipicephalus sanguineus* (the brown dog tick).

Although canine ehrlichiosis is transmitted by the brown dog tick, *Rhipicephalus sanguineus*, this tick is probably not the main vector or reservoir involved in human transmission since it rarely bites people. Because transovarian transmission does not occur in this tick, foxes, coyotes, wolves, deer, rodents and chronically infected dogs should be considered possible reservoirs. There is no evidence that human ehrlichiosis is transmitted directly from dogs to people. In the United States, serological evidence of *E. canis* infection has been reported among dogs in at least 34 states.

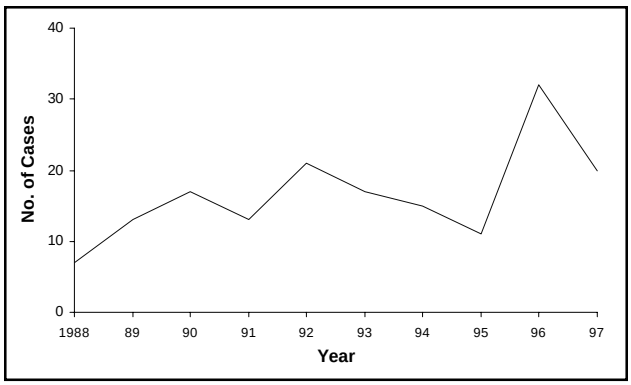


Figure 1. Ehrlichiosis cases by year of report, Missouri, 1988–97

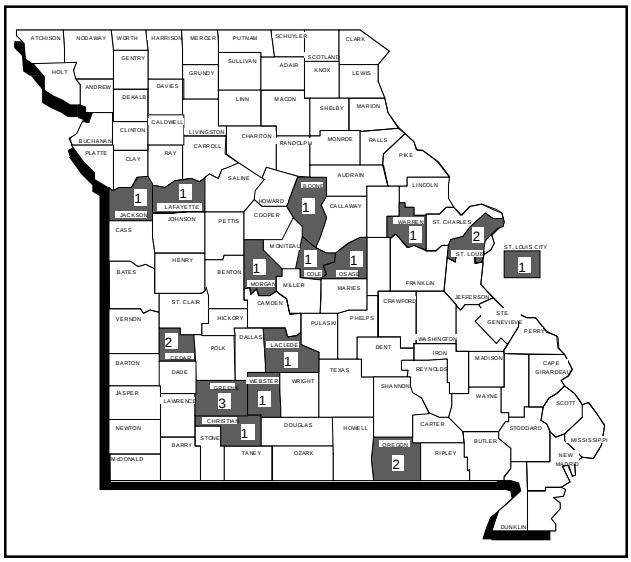


Figure 2. Ehrlichiosis cases by county, Missouri, 1997

Missouri reported 7 cases of ehrlichiosis in 1988. From 1988–1997, a total of 166 cases of ehrlichiosis have been laboratory confirmed. (See Figure 1.) Missouri continues to account for the majority of the ehrlichiosis cases reported nationally. In 1997, 20 cases of ehrlichiosis were reported. Figure 2 shows the location of those cases by county.

Males are affected more than females, and the majority of patients are between 30–60 years of age (age range 2–68 years). Twenty states have reported patients, the majority of which are in the

southeastern and south-central areas of the country. Onsets of illness occur between March and October.

Human ehrlichiosis resembles Rocky Mountain Spotted Fever (RMSF) both clinically and epidemiologically. Most reported cases were suspected to have RMSF but did not develop antibodies to RMSF. Fever and headache are usually present, but rash is present in only about 41 percent of ehrlichiosis cases compared to 88 percent of RMSF cases. The diagnosis of ehrlichiosis is suggested by signs and symptoms compatible with ehrlichiosis and a history of tick bite one to three weeks prior to onset of symptoms. It is confirmed by indirect fluorescent antibody testing for antibodies against *E. chaffeensis*. Diagnosis currently requires a greater than or equal to fourfold increase/decrease in antibody titer to *E. chaffeensis* in acute- and convalescent-phase serum samples.

Control and prevention is best achieved by avoiding unnecessary exposure to ticks, following the standard guidelines for avoidance of tick borne diseases.

Histoplasmosis

Histoplasmosis presents as a granulomatous disease of the lungs with varying degrees of severity. Normally children are infected while playing in dirt that contains histoplasma spore forms known as conidia; infection results from inhalation of airborne conidia. The disease usually causes sniffles for a few days, with the child not complaining of any illness. The healthy child wards off the disease and the infection is not recognized until later in life when chest X-rays show walled off, old lesions of histoplasmosis.

Single point source outbreaks do occur when an area high in histoplasma spores is excavated and the airborne spores expose susceptible individuals. Casual contact with spore-laden soil can cause disease in immunosuppressed individuals.

Histoplasmosis is an endemic mycotic disease in Missouri and the Missouri and Mississippi River Valley Regions. Field studies have shown up to 85 percent of rural Missourians skin test positive for histoplasmosis.

Historically, Missouri averaged about 185 new cases of histoplasmosis each year. However, reported incidence dropped dramatically when the State Public Health Laboratory ceased providing diagnostic testing as of June 30, 1988. There were 3 cases reported in 1996 and 6 cases reported in 1997. (See Figure 1.) In the absence of diagnostic testing, this does not reflect the true incidence of histoplasmosis in the state.

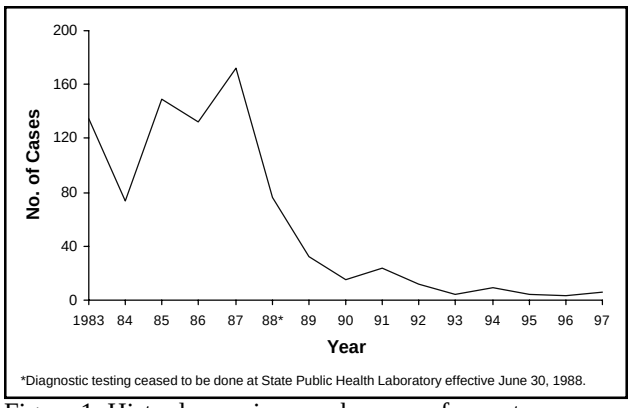


Figure 1. Histoplasmosis cases by year of report, Missouri, 1983–97

Leptospirosis

Leptospirosis is a bacterial infection of man and animals that is prevalent throughout the world. The disease manifests itself with a sudden onset, fever which maybe diphasic, headache, severe myalgia, conjunctival suffusion, rash with hemorrhage into the skin and mucous membranes, jaundice, renal involvement and meningitis resulting in mental confusion or depression. Illness can last from weeks to months. The organism is eliminated from the host via the kidney in the urine. Transmission in nature is by skin contact with urine-contaminated water, soil or vegetation.

Prevalence of leptospirosis in animals in Missouri is high, causing sufficient disease and economic loss to justify the annual vaccination of cattle and canine. This, coupled with wild animal infection, creates the risk of leptospirosis in man. For various reasons, the disease is under-diagnosed and under-reported in humans in Missouri. Farmers and farm laborers are at risk of exposure to the organism as an occupational hazard. In 1996, there was one case reported and in 1997 no cases were reported. (See Figure 1.)

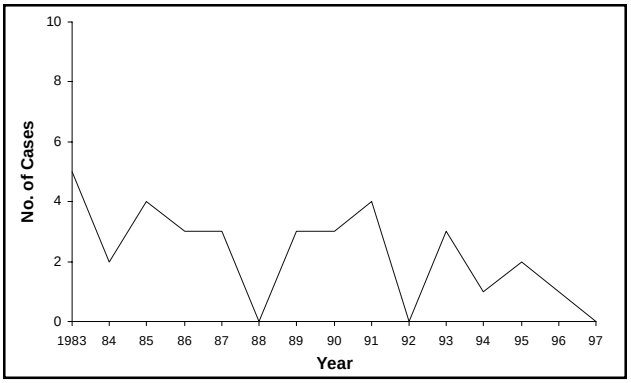


Figure 1. Leptospirosis cases by year of report, Missouri, 1983–97

Psittacosis

Psittacosis is a chlamydial disease of birds and man resulting in respiratory tract manifestation. The disease is characterized by influenza-like symptoms of fever, headache and myalgia, which can progress to pneumonia. Transmission is by direct contact and inhalation of the organisms from an infected host.

With the increased popularity of birds as companion animals and the poor quarantine measures for psittacine birds entering the United States, the incidence of psittacosis is increasing. That increase is not evident in Missouri.

Missouri experiences numerous epizootic outbreaks of psittacosis in aviaries. One case of psittacosis was reported in each of the years 1996 and 1997. (See Figure 1.)

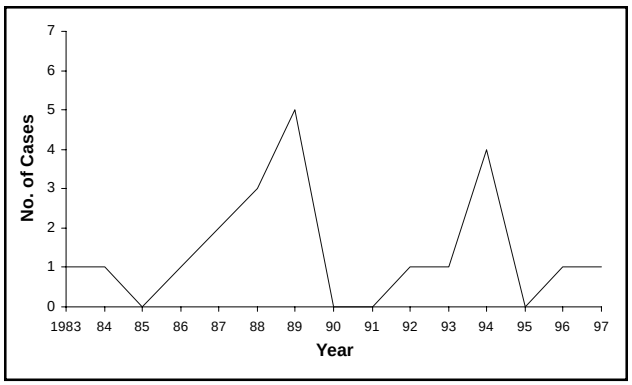


Figure 1. Psittacosis cases by year of report, Missouri, 1983–97

Rabies

Rabies is a fatal viral disease due to a rhabdovirus of the genus *Lyssa-virus*. It is a neurogenic virus, which results in acute encephalomyelitis in all warm-blooded mammal species. The onset is usually benign in nature with a sense of anxiety, headache, fever, malaise and sensory changes at the site of a previous animal bite. The disease progresses rapidly to paresis, paralysis and/or muscle spasms. Death is due to respiratory paralysis. Missouri had its last human rabies case in 1952.

An estimated 50,000 cases of human rabies occur annually in the world, mostly in developing nations. The United States has had one to two human rabies cases a year for the past decade, with a number of these resulting from exposure outside the continental United States. (See Figure 1.) The decreased number of human rabies cases in the developed nations of the world is attributed to the control of stray animals and the mandatory vaccination of dogs and cats to serve as a buffer zone between the wildlife reservoir of rabies and the human populace. All animal bites are evaluated for possible rabies exposure and an estimated 50,000 post-exposure rabies treatments are administered annually in the United States. A passive surveillance system is utilized to detect the prevalence of rabies in the animal populations.

Missouri continues to experience a low prevalence of rabies activity, with only 26 cases of animal rabies reported in 1996 and 31 cases reported in 1997. Missouri has two reservoirs for rabies: the skunk, which is affected with two different strains, and the bat. Since 1990, Missouri has averaged only 31 reported animal rabies cases per year. (See Figure 2.) Rabies is endemic in the entire state. Over the past decade, rabies has occurred in 93 of 114 Missouri counties.

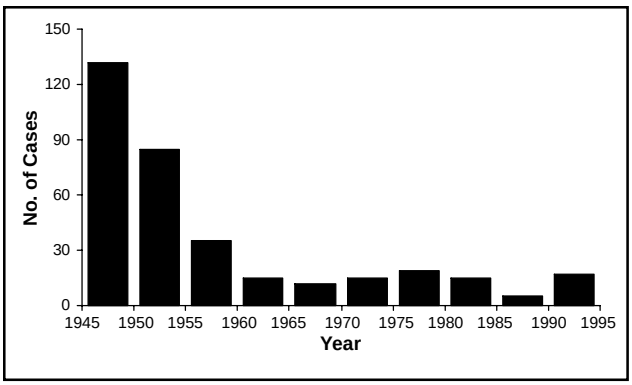


Figure 1. Human rabies cases by five-year intervals, United States, 1945–95

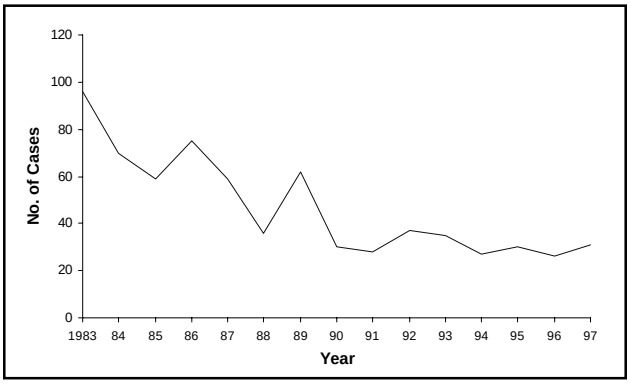


Figure 2. Positive animal rabies specimens by year, Missouri, 1983–97

The most important reason for the declining incidence of animal rabies is the decrease in the skunk population, the primary reservoir of rabies in Missouri. This has reduced the interaction and consequent spread of the disease. The low incidence of skunk rabies has also decreased rabies in other animals normally exposed to this reservoir.

The Department of Health has a model rabies and animal control document that all individual counties have the authority to implement. The document is comprehensive and covers all aspects of observation periods, proper vaccination of dogs and cats, general animal control and dangerous animal control.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is a rickettsial disease transmitted to man via the tick, *Dermacentor variabilis*, which is the reservoir for RMSF. Onset of the disease occurs 3–14 days after an infected tick has bitten a susceptible individual. The organism is maintained in the midgut of the tick and is passed into the individual during the feeding process. It is also passed in tick fecal material and individuals can be infected by brushing the organism into abraded skin. Person to person transmission does not occur.

The disease is characterized by flu-like symptoms of fever, headache, malaise, myalgia and usually a maculopapular rash, which appears on the palms and soles. The disease should be diagnosed by clinical signs and with either the CF or IFA test. The mortality rate can be as high as 15–20 percent in untreated cases.

During the last 15 years (1983–97), a total of 391 cases of Rocky Mountain spotted fever have been reported in Missouri, or an average of 26 cases per year. (See Figure 1.) In 1996, 19 cases were reported and in 1997, 24 cases were reported.

Figure 2 shows Rocky Mountain spotted fever cases by county for 1997.

From 1988–97, Missouri has had five deaths due to Rocky Mountain spotted fever, a case fatality rate of 19.3 per 1,000.

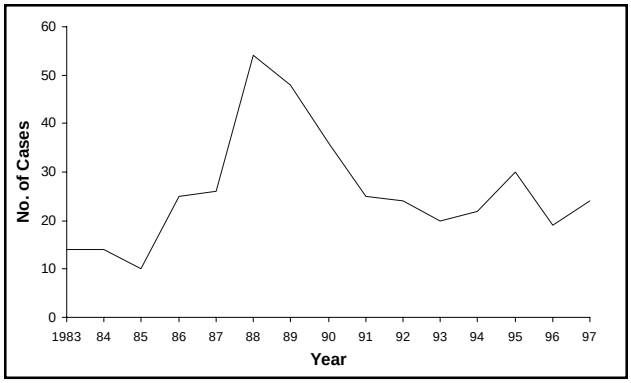


Figure 1. Rocky Mountain spotted fever cases by year of report, Missouri, 1983–97

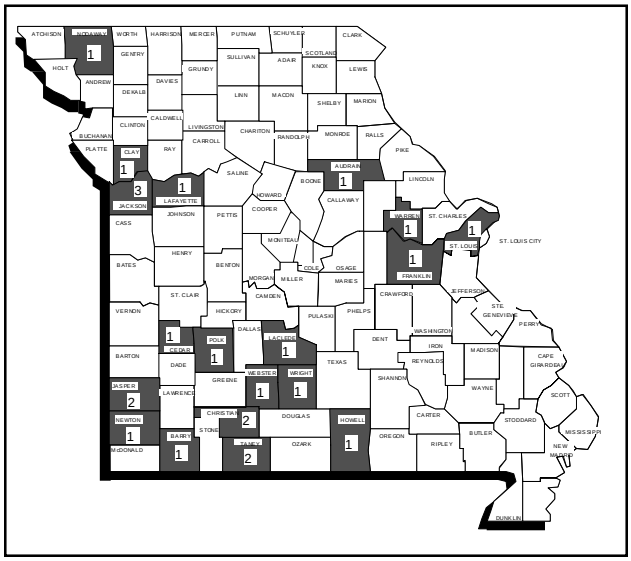


Figure 2. Rocky Mountain spotted fever cases by county, Missouri, 1997

Tularemia

Tularemia is a bacterial disease of wildlife and man. Wild rabbits are the primary reservoir. It is transmitted to man primarily through the blood meal of an infected tick or by direct contact with the organism while skinning or cleaning an infected wild rabbit. Infection can occur from contact with the organism either in contaminated water or meat or from the mouth of an animal, which has just consumed infected meat. The disease manifests itself with an indolent ulcer at the site of inoculation and regionally enlarged, painful lymph nodes. Other routes of infection produce specifically related signs and symptoms. The disease can progress to systemic and pulmonary manifestation with a case fatality rate of five to ten percent.

Missouri and the Ozark Plateau are endemic for tularemia. Missouri and Arkansas usually lead the nation in total number of cases reported. During the last 15 years (1983–97), a total of 504 cases of tularemia have been reported in Missouri, or an average of 34 cases each year. (See Figure 1.) In 1996, 9 cases were reported and in 1997, 18 cases were reported. The percentage of people who contract the disease from exposure to ticks or rabbits is about equal. The disease occurs more often in males than females, probably due to differences in exposure. Figure 2 shows tularemia cases by county for 1997.

In 1995, Missouri had three deaths due to tularemia. There were no deaths reported in 1996 or 1997.

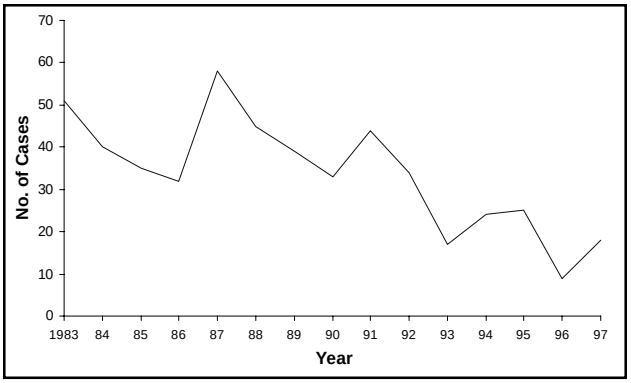


Figure 1. Tularemia cases by year of report, Missouri, 1983–97

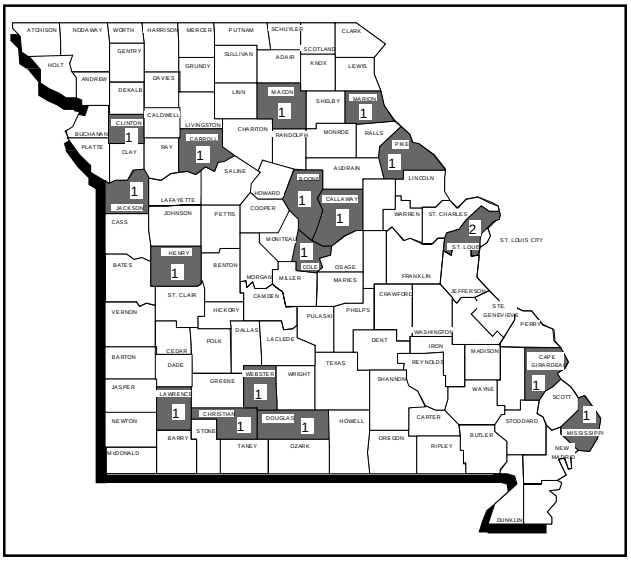


Figure 2. Tularemia cases by county, Missouri, 1997

Diseases of Low Incidence

Disease	1996	1997
Amebiasis	31	9
Botulism	1	0
Kawasaki Disease	23	8
Legionellosis	18	26
Listeria monocytogenes	8	9
Malaria	11	16
Tetanus	1	0
Toxic Shock Syndrome	5	8
Trichinosis	0	1
Typhoid Fever	2	1

There were no reported cases of anthrax, cholera, plague or Reye syndrome during these two years.

Other Reported Diseases

Disease	1996	1997
Chickenpox	5,830	6,319
Fifth Disease*	482	626
Pediculosis	21,308	26,657
Scabies	1,423	1,541
Scarlet Fever	379	415

*Erythema infectiosum or human parvovirus infection

Source: Data from active and passive surveillance systems

Environmental and Occupational Diseases and Conditions

Carbon Monoxide Poisoning

Carbon monoxide (CO) is a colorless, odorless gas given off by automobiles, furnaces, charcoal grills, kerosene heaters and other sources that create heat through combustion.

Carbon monoxide is rapidly absorbed through the lungs, and the rate of absorption is directly related to alveolar ventilation. Once absorbed, it attaches to hemoglobin at the oxygen-binding sites with an affinity 250 times greater than that of oxygen, thereby reducing the oxygen-carrying capacity of the body. Combined, these actions result in varying degrees of hypoxia, which can adversely affect the brain, heart and other body organs.

Carbon monoxide poisoning became a reportable condition in Missouri in April 1993. Carboxy-hemoglobin levels above 15 percent are reportable. Thirty-two cases were reported in 1996, and of these, 22 were confirmed by laboratory testing. In 1997, 32 cases were reported, with 20 being laboratory confirmed. Two of the cases reported in 1996 were suicides; no suicides were reported in 1997.

Carbon monoxide poisoning occurs throughout the year, but the risk is greater during the winter months with the use of gas or kerosene heaters (especially space heaters). In 1996, 12 cases (38%) occurred during the winter months of January, February, November and December. In 1997, 8 cases (25%) occurred during the same time period. (See Figure 1.)

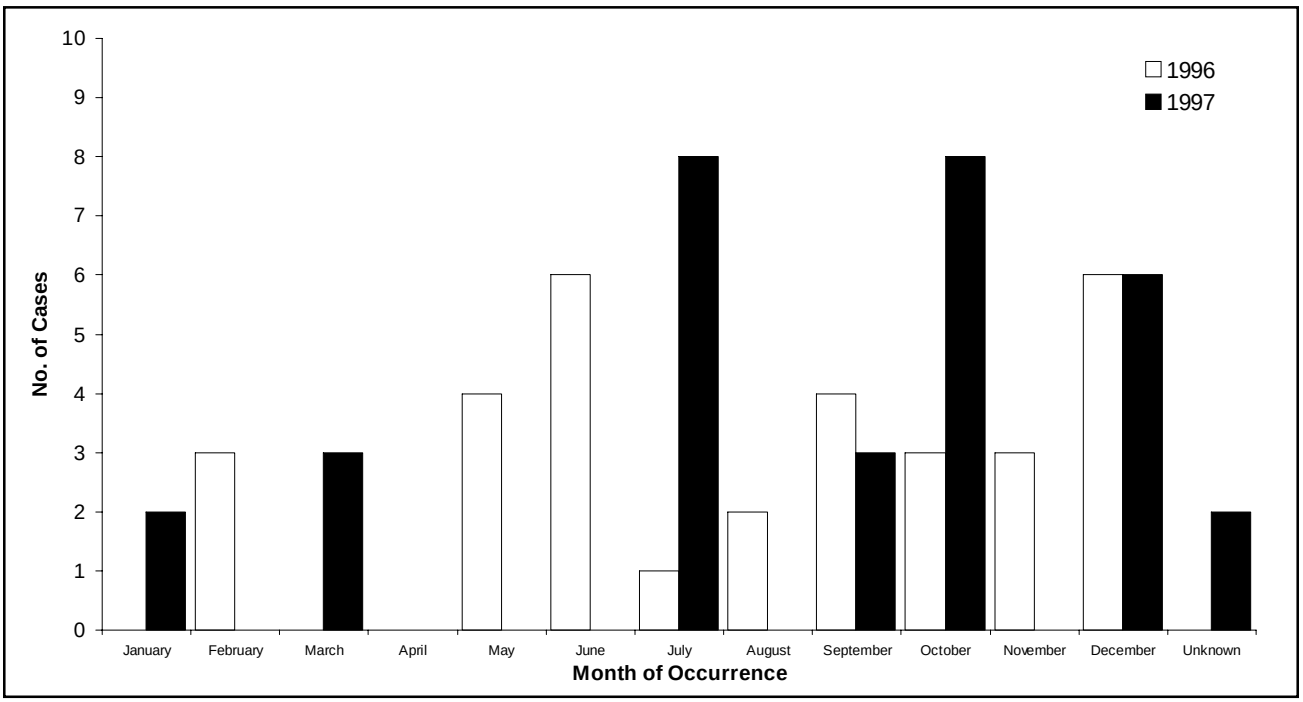


Figure 1. Carbon monoxide cases by month of occurrence, Missouri, 1996 and 1997

Childhood Lead Poisoning

Lead is a neurotoxin. Lead poisoning may result in decreased intelligence, impaired neurobehavioral development and cognitive function, decreased growth, and visual and hearing deficits. It may also result in adverse effects on the central nervous, renal (kidneys) and hematopoietic (blood-producing) systems. Very high levels or prolonged exposure result in coma, convulsions and death. However, most lead poisoned individuals have no warning signs or symptoms.

Lead enters the body through inhalation and ingestion. Sources of lead exposure include industrial or occupational settings, such as lead smelting, plumbing and automotive repair; hobbies, such as ceramics, stained glass-making and casting ammunition and fishing weights; soil and dust with high lead levels from paint, leaded gasoline emissions and industry; drinking water contaminated by lead pipes or lead-soldered joints; imported mini-blinds; some types of jewelry; and folk medicines.

Lead levels in children under age 18 are considered to be elevated when test results of whole blood are greater than nine micrograms per deciliter (>9 µg/dl). Blood lead test results for persons 18 years of age or greater are considered elevated when the level is 25 µg/dl or more.

Childhood lead poisoning is one of the most common environmental pediatric health problems in the United States today, and is entirely preventable. Virtually all children in the United States are at risk for lead poisoning; no socioeconomic group, geographic area or racial or ethnic population is spared. Missouri's large lead mining and smelting industry places its citizens at even higher risk for lead poisoning.

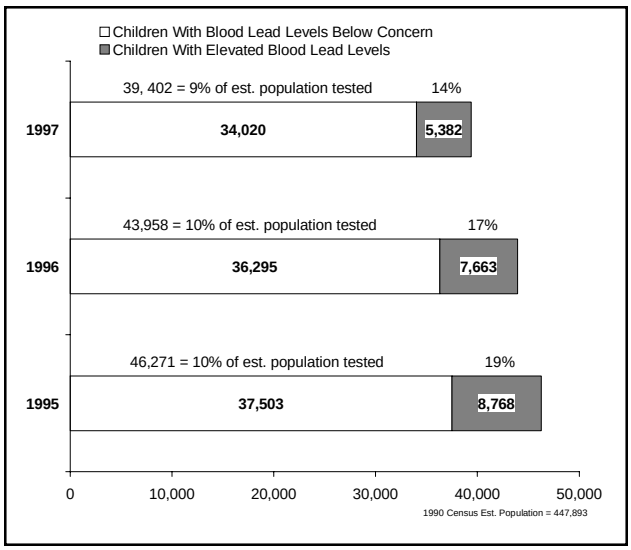


Figure 1. Percentage of children less than 6 years of age tested and positive for elevated blood lead levels by year, Missouri, 1995, 1996 and 1997

Although there are many sources of lead found in the environment, lead-based paint is the most common source of lead exposure for children. In 1978, paint with high concentrations of lead was banned for household use, but houses built before 1980 often still contain lead-based paint. As this paint deteriorates, it flakes or chalks; it may also be disturbed during renovation, creating paint chips and dust. The normal hand-to-mouth activity of very young children places them particularly at risk for being adversely affected by this exposure.

Due to the serious nature and long-term consequences of childhood lead poisoning, the U.S. Department of Health and Human Services, Health Care Financing Administration nationally mandated in 1993 that all Medicaid eligible children less than 6 years of age be tested for lead poisoning. Also in 1993, elevated blood lead levels became a reportable condition in Missouri and data on blood lead levels has been collected by the Missouri Department of Health since then.

During 1996, 43,958 (10%) of Missouri children less than 6 years of age were tested for lead. Of those children tested, 7,663 (17%) had blood lead levels >9 µg/dl. In 1997, 39,402 (9%) children in this age range were tested for lead, and 5,382 (14%) were reported with blood lead levels greater than 9 µg/dl. (See Figure 1.)

Hazardous Substances Emergency Events*

The Missouri Hazardous Substances Emergency Events Surveillance (HSEES) system tracks and monitors non-petroleum hazardous substances emergency events (spills, releases, accidents, or threats of these) that occur in Missouri. The HSEES program collects data on injuries associated with emergency events, as well as information about the event and the number of people potentially at risk in the area surrounding the event. Missouri is one of 13 states with a HSEES program. The program is funded by the Agency for Toxic Substances and Disease Registry (ATSDR) and began collecting data in Missouri on October 1, 1993.

In 1996, 160 hazardous substances emergency events met the case definition. Twelve (7%) events involved 59 victims, including 2 deaths. Six events involved 1 victim, 2 events involved 2 victims, 1 event involved 4 victims, 1 event involved 5 victims, 1 event involved 11 victims, and 1 event involved 29 victims. Persons employed at the scene were the largest group injured (51 of 59 victims) and 2 of these employees died. Other victims included 4 members of the general public, 3 responders, and 1 police officer. (See Figure 1.)

The most common type of injury reported in 1996 was respiratory irritation, which occurred in 48 (81%) of the victims. Other types of injuries/ symptoms reported were eye irritation, dizziness or other central nervous system symptoms, nausea/ vomiting, chemical burns, skin irritation, and trauma. (See Figure 2.) Of the 59 victims, 24 (41%) were admitted to a hospital for treatment. Figure 3 shows the breakdown of injuries by severity.

In 1996, 19 substances were involved in the 12 events resulting in injuries. Two (17%) of these 12 events with injuries involved ammonia. The following substances were involved in one event each: acetic acid, aluminum powder, ammonium nitrate, chlorine, diesel**, epoxy resin, ferrosilicon, hexachloroethane, hydrogen sulfide, isopropanol, nitric acid, paint, phosphoric acid, potassium hydroxide, sodium hypochlorite, styrene monomer, sulfuric acid, and zinc oxide.

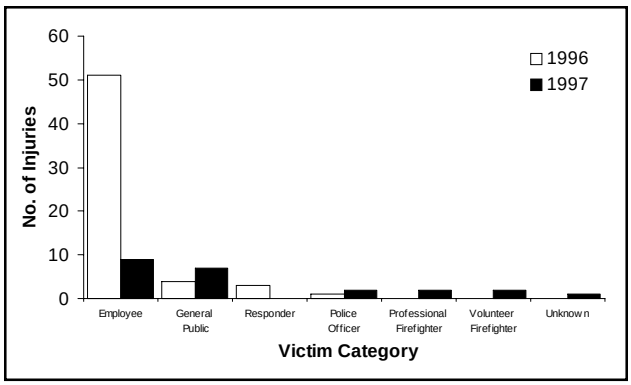


Figure 1. Number of injuries reported by type of victim category, HSEES, Missouri, 1996 and 1997

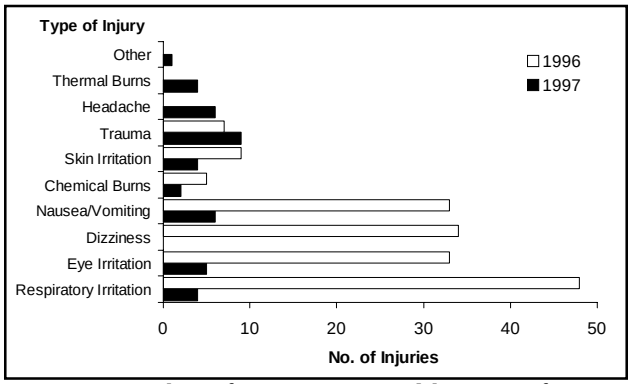


Figure 2. Number of injuries reported by type of injury, HSEES, Missouri, 1996 and 1997

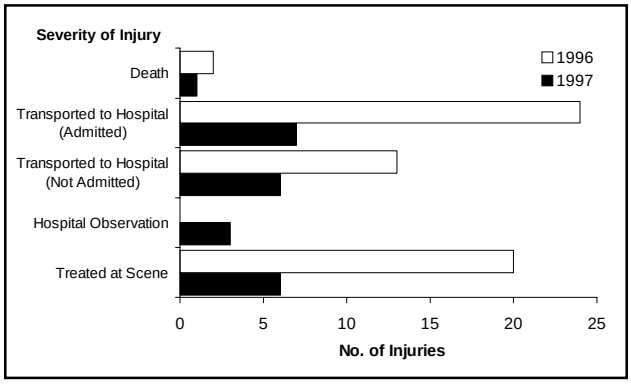


Figure 3. Number of injuries reported by severity, HSEES, Missouri, 1996 and 1997

In 1997, 183 hazardous substances emergency events met the case definition. Thirteen (7%) of these events involved 23 victims, including 1 death. Nine events involved 1 victim each, 1 event involved 2 victims, 1 event involved 3 victims, 1 event involved 4 victims, and 1 event involved 5 victims. Eighteen (78%) of those injured were male, and 5 (22%) were female. Persons employed at the scene were the largest group injured in 1997 (9 of 23 victims) and 1 employee died. Seven members of the general public, 2 professional and 2 volunteer firefighters, 2 police officers, and 1 person of unknown status were also injured. (See Figure 1.)

The most common types of injuries reported in 1997 were trauma with 9 (39%) victims, and headache and nausea/vomiting, both of which occurred in 6 (26%) victims. Other types of injuries/ symptoms reported were respiratory irritation, eye irritation, chemical burns, thermal burns, and skin irritation. (See Figure 2.) Of the 23 victims, 7 (30%) were admitted to a hospital. Figure 3 shows the breakdown of injuries by severity.

In 1997, 12 substances were involved in the 13 events where injuries occurred. Only 1 chemical was involved in more than 1 event with injuries. Formaldehyde was released in 2 (15%) events with a total of 4 victims. Other substances involved in events with injuries were A Triple F, acetone, anhydrous ammonia, chlorine, magnesium, methyl bromide, nitric acid, paint, potassium hydroxide, sodium hydroxide, pesticides and a pesticide mix.

*This report was supported by funds from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) trust fund provided to the Missouri Department of Health under Cooperative Agreement Number U61/ ATU780955-05 from the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services.

** Petroleum products are included when they are released with other non-petroleum hazardous substances.

Heavy Metal Poisoning

Heavy metal poisoning became a reportable condition in Missouri in April 1993. Poisonings reported in this category include all metal poisonings except lead. Lead poisoning is a separate reporting category. Reports have been received on cases of mercury, arsenic, cadmium and zinc poisonings in 1996 and 1997. (See Figure 1.) Cases were reported primarily by laboratories and hospitals.

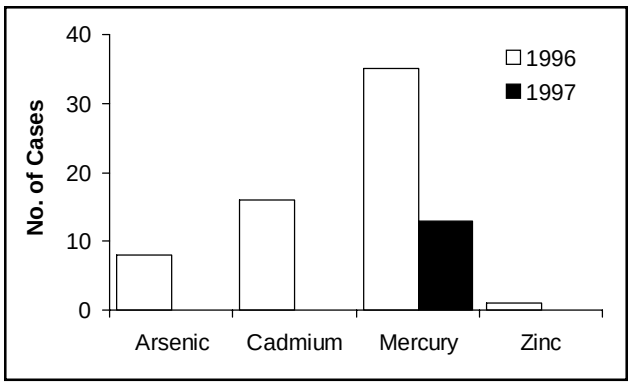


Figure 1. Number of heavy metal poisoning cases reported, Missouri, 1996 and 1997

Mercury poisoning can affect the nervous system. Effects include personality changes (irritability, shyness, nervousness), tremors, changes in vision or hearing and difficulties with memory. In addition, mercury poisoning can cause damage to the kidney or to a developing fetus. In 1996, 35 cases of mercury poisoning were reported. Thirteen cases were reported in 1997.

Arsenic poisoning can cause irritation of the stomach and intestines, skin changes and impaired nerve function. Inhaled inorganic arsenic increases the risk of lung cancer. Large doses of inorganic arsenic (above 60,000 parts per billion in food or water) can cause death. In 1996, 8 cases of arsenic poisoning were reported while none were reported in 1997.

Exposure to higher levels of cadmium can cause proteinuria (elevated protein in urine). In addition, effects of inhaled cadmium range from lung irritation to cancer. Sixteen cases of cadmium poisoning were reported in 1996 while none were reported in 1997.

Zinc is one of the most common elements in the earth's crust and is an essential part of our diet. Eating too much zinc can cause stomach cramps, nausea, vomiting and long-term ingestion can result in anemia, pancreas damage and lower levels of high-density lipoprotein cholesterol. Breathing zinc can cause a short term disease called metal fume fever that is believed to be an immune response affecting the lungs and body temperature. One case of zinc poisoning was reported in 1996 while none were reported in 1997.

Workplace Fatalities

Approximately 12 workers die each month and 150 workers die each year on the job in Missouri. According to the latest Department of Health data, Missouri's overall civilian work force fatality rate averages about 5.0 per 100,000 workers. The leading causes of these deaths are motor vehicle, homicide, contact with objects and machinery, falls, and electrocutions. Though our overall fatality rate may be slightly lower than the national average, we do have industries that are high risk. Missouri's three highest risk industries for fatal injuries are agriculture/forestry/fishing, transportation/ communication/public utilities, and construction.

According to the National Institute for Occupational Safety and Health (NIOSH), during the period of 1980–1989, approximately 106 workers died each year as a result of a workplace injury in Missouri. The Missouri Occupational Fatality Assessment and Control Evaluation (MO FACE) Program identified 140 and 123 workplace fatalities in Missouri in 1996 and 1997 respectively.

This increase is not due to an increase in the worker fatality rate, but due to the establishment of MO FACE and an active occupational fatality surveillance system. This surveillance system is designed to monitor, track, and investigate all work-related fatalities in Missouri. With this system, coroners, medical examiners, and emergency responders are now more aware of what constitutes a worker fatality. We provide them with an outlet to report a fatality and feedback on how and where this information is used. Figure 1 shows reports of workplace fatalities by reporting agency and average number of days to report to the MO FACE active occupational fatality surveillance system. Figure 2 shows the notification time delays in reporting workplace fatalities.

The MO FACE Program was established in October 1991with a five year grant from NIOSH. The program conducts in-depth epidemiological investigations of work-related fatalities and works closely with employers involved in workplace fatalities to help them take steps to prevent similar incidents from occurring. The program also develops intervention initiatives, such as workshops and seminars, to help employers recognize workplace hazards and prevent fatalities before they occur.

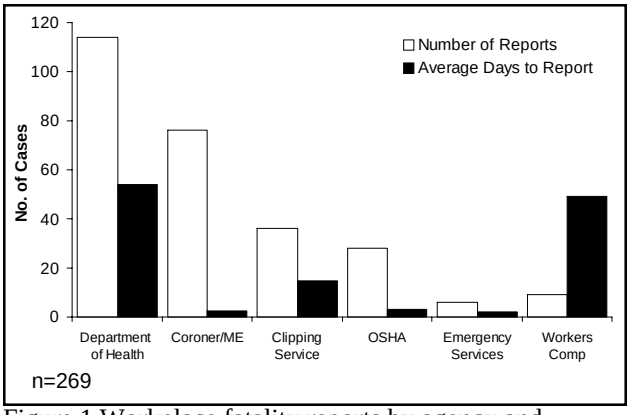


Figure 1.Workplace fatality reports by agency and average number of days to report, MO FACE Program, FFY 1996 and 1997.

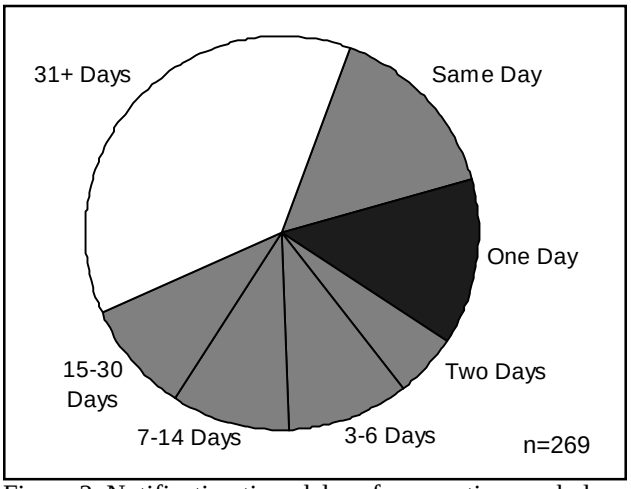


Figure 2. Notification time delays for reporting workplace fatalities, MO FACE Program, FFY 1996 and 1997.

During the reporting period of October 1, 1996 through September 30, 1997, the MO FACE Program received 321 reports of possible workplace fatalities. Of these, 140 were confirmed

to be fatalities in the workplace. On-site investigations were conducted on 10 of the fatalities: 7 machinery-related, 2 falls, and 1 electrocution.

The MO FACE Program was notified of more than 300 possible workplace fatalities in FY97. Of these deaths, a total of 138 traumatic workplace fatalities were identified during the reporting period of October 1, 1996 through September 30, 1997. On-site investigations were conducted on 15 of the fatalities: 11 falls, 2 machinery-related, 1 electrocution, and 1 trench cave-in.

With six years of data collected, agriculture continues to be the highest-risk industry and occupation in Missouri with tractor rollovers being the leading contributor of these deaths. Overall, the most frequent cause of occupational death is motor vehicle incidents.

Almost all of the above deaths were preventable. The continuation of this program will ensure further development and implementation of targeted interventions for high-risk occupations and industries, educating workers in safe work behaviors and procedures.

Other Environmental and Occupational Diseases and Conditions

Disease	1996	1997
Acute Chemical Poisoning	56*	3
Asbestosis	0	1
Pesticide Poisoning	3	0

There were no reported cases of byssinosis, farmer's lung, methemoglobinemia, silicosis or toxic organic dust syndrome during these two years.

* The majority of these cases were occupational exposures. Forty cases were the result of three occupational exposures. A malfunctioning smoke bomb during a fire drill injured 11 people. Two separate construction company incidents injured 14 and 15 people respectively.